# ORIVING TOMORROW'S CARS!

AUGUST 1959 35c

# Motor Trend

"THE AUTOMOTIVE TESTING MAGAZINE"

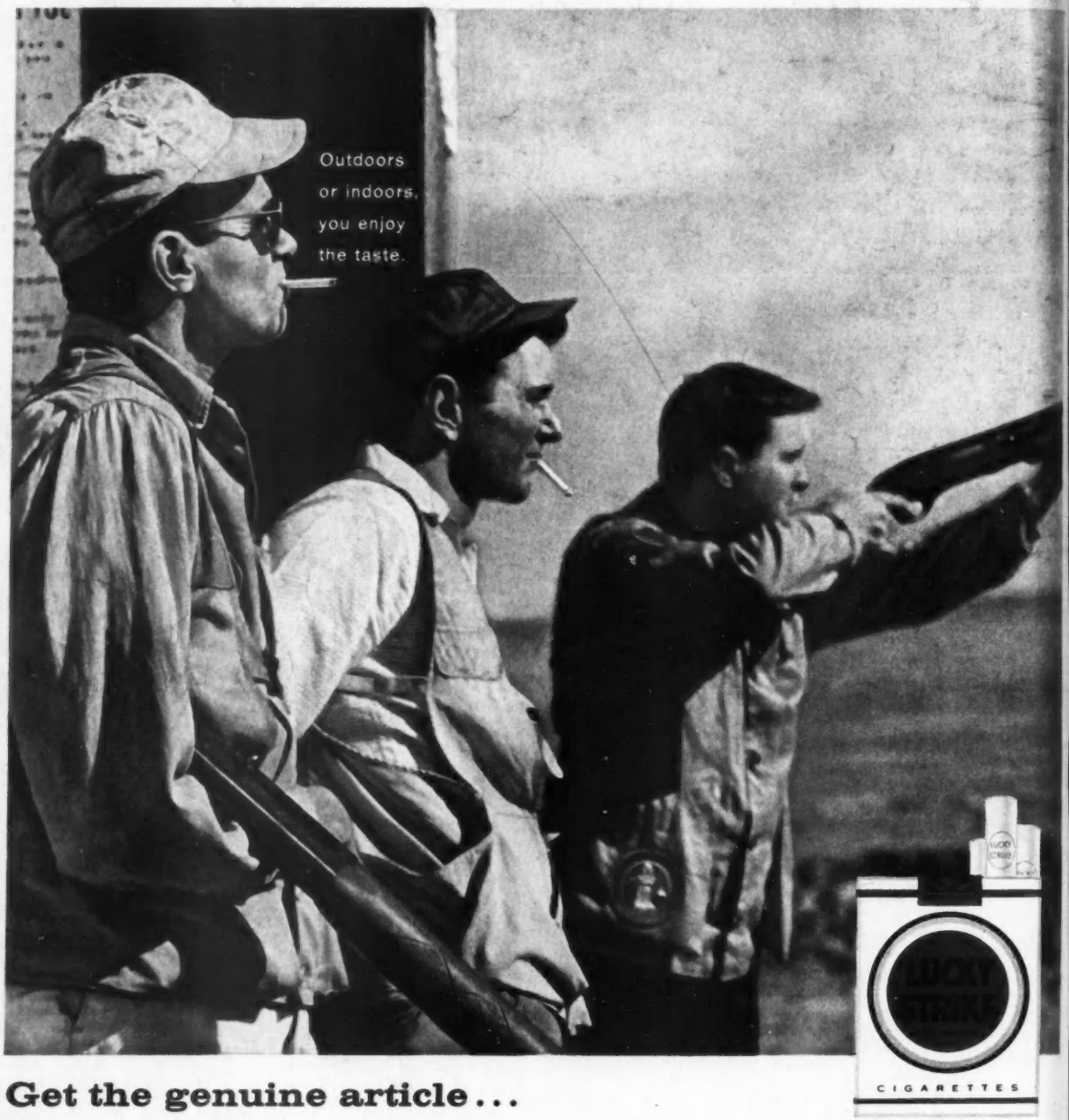
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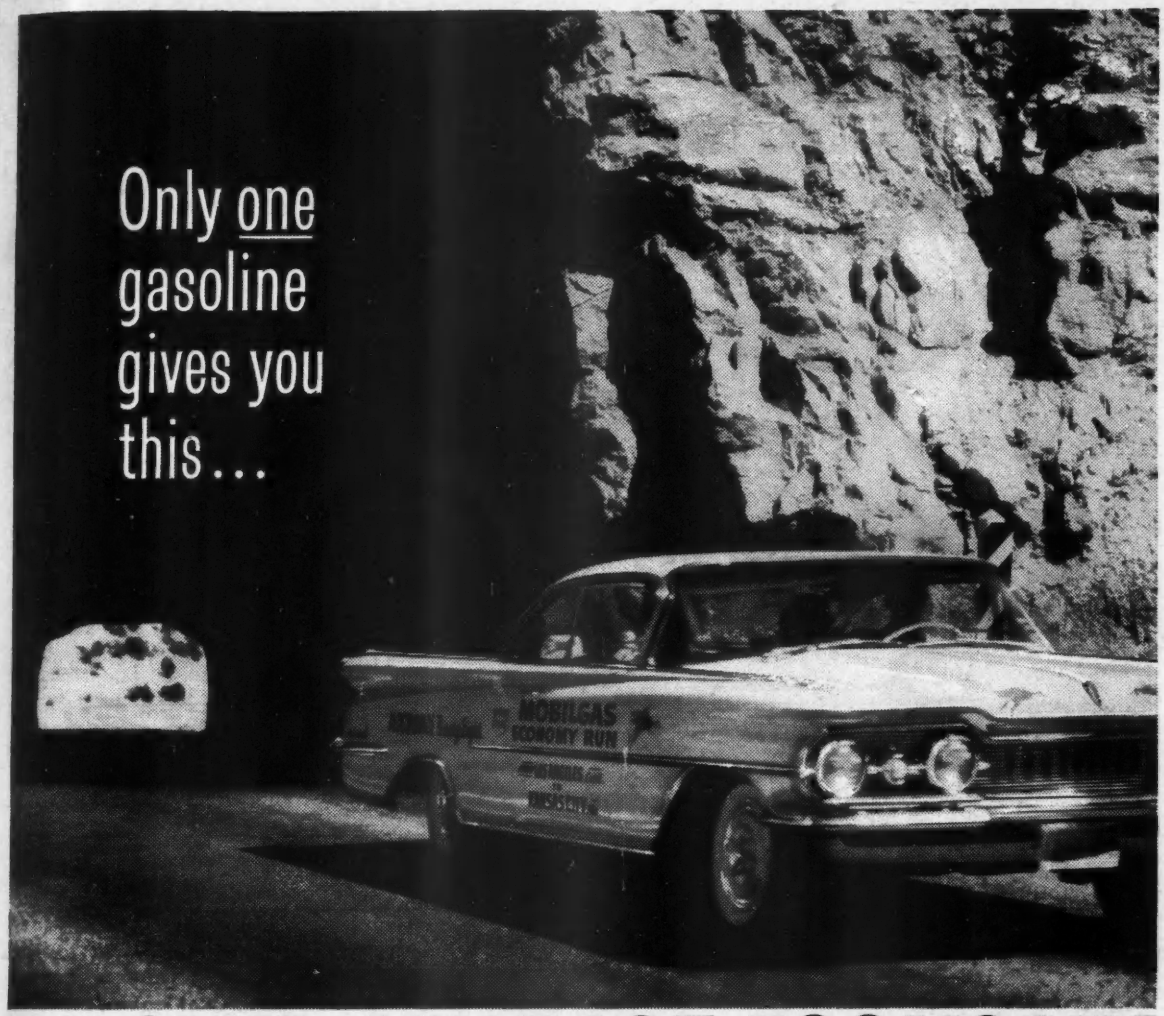



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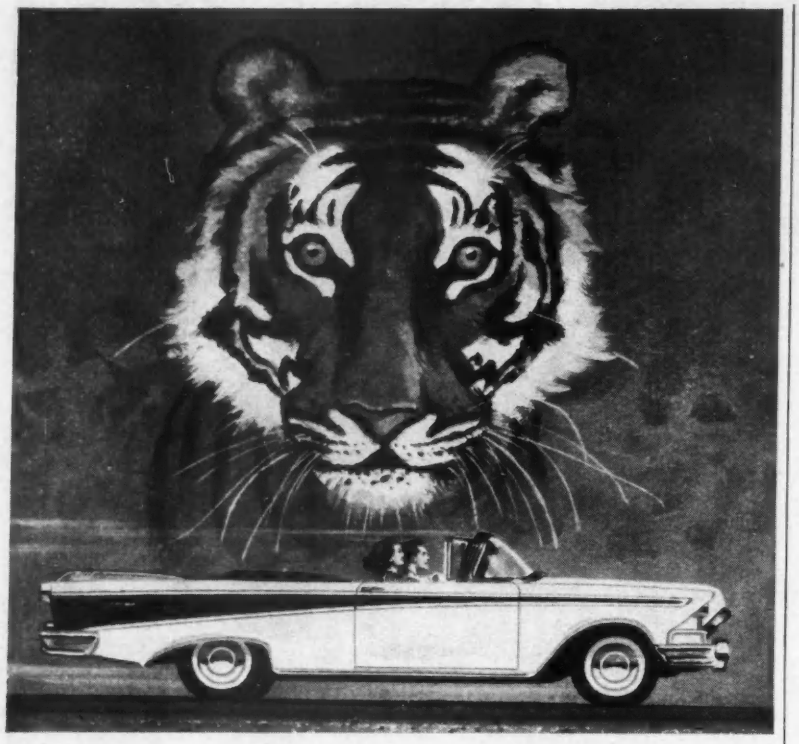
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**In the Mobilgas Economy Run,** 47 brand new stock cars, driven by people like you, averaged **19.44 miles per gallon** using Mobilgas Special, The New Car Gasoline. Try it yourself—the one gasoline that has proved its mileage economy publicly in every make of American car.




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*For a superlative straight-through muffler, ask to see the exciting premium-quality Super-G muffler.*

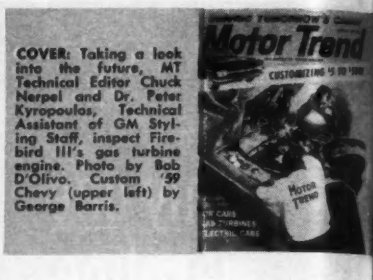



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**COVER:** Taking a look into the future, MT Technical Editor Chuck Nerpel and Dr. Peter Kyropoulos, Technical Assistant of GM Styling Staff, inspect Firebird III's gas turbine engine. Photo by Bob D'Olivo. Custom '59 Chevy (upper left) by George Barris.


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# Motor Trend

"THE AUTOMOTIVE TESTING MAGAZINE"


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Successful Supercharging

YES—The Granatelli Brothers, former Chicagoans where they operated Grancor Automotive Specialists and Soldier Field Auto Racing, dissolved Grancor in March, 1957, and moved to California where they have purchased Paxton Products division of McCulloch Corp., and for the past year have been sole owners, manufacturers, and distributors of McCulloch and Paxton Superchargers, doing business as PAXTON PRODUCTS.

With their experience in building racing engines and knowledge of Supercharging they developed the new DO-59 Supercharger which is now a sturdy one-year old with an outstanding record for performance and reliability. The DO-59 Supercharger carries a factory warranty of one year or 12,000 miles and is the finest Supercharger ever put on the market. Fits all engines from 100 to 800 cubic inch displacement.

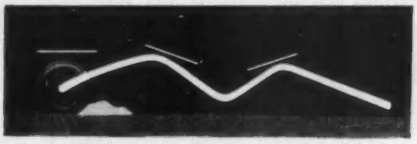
TESTED AND APPROVED MOTOR TREND MAY 59

**Latest & Hottest!**

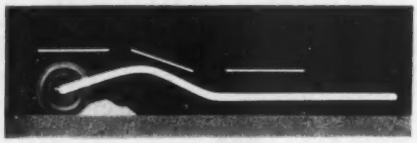
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Here's what happens with worn shocks. Wheel hits bump, then returns to road . . . but violent spring recoil pulls it off road a second time. Meanwhile car body (indicated by plane lines) rocks severely. This causes serious loss of control, shakes up passengers, takes miles off tires.



With new Gabriel Ajustomatic shock absorbers, wheel hits bump, returns to road . . . and stays there! Spring recoil is absorbed, entire car recovers from impact almost instantly. Besides increasing safety, comfort and tire mileage, this helps prevent spring breakage, actually lengthens car life!

**Gabriel Ajustomatic shock absorbers give greater comfort and car control**

If you've gone over 20,000 miles on your present shock absorbers, chances are you need new ones. Ask your service station attendant or garage mechanic to give your shocks the Gabriel safety check now . . . especially if you are planning a family trip soon. And if you *do* need new ones, tell the man you want Gabriel Ajustomatics, the modern shock absorbers that can be adjusted to give you the kind of ride you need, for the kind of driving you do!

GABRIEL WINS AT DAYTONA!



Lee Petty won the 500-mile stock car race at Daytona riding on Gabriels! Lee says: "It was a wonderful feeling riding on those Gabriel shocks. They gave me perfect control, even on the curves. I wouldn't have any other shocks on my race car . . . or family car, either!"

Gabriel
ADJUSTABLE SHOCK ABSORBERS

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# Letters FROM OUR READERS

**BIGGEST MISTAKE?**

Dear Sirs:

I have been reading quite a bit lately about Detroit trying their hand at building a small car. And from the sketches shown in yours and other car magazines, I am sure it is going to be the biggest mistake Detroit has ever made.

What people want is a car the size of a '54 Ford or '55 Chevrolet with half the horsepower of today's car but with all of its improvements.

My suggestion to Detroit is that they bring out a car a little bigger than they have planned and call it the Ford or Chevrolet, respectively, and change the names of the present Ford and Chevy to Fairlane and Impala.

Gerry Petit — Roxbara, Que., Canada

**ONLY WAY OUT**

Dear Sirs:

Most car buyers do not appreciate the many fine points of difference between cars, and today they see uniformity in the showrooms. It used to be easy to tell a plain-looking inexpensive car from a finny Cad, for instance. Today, the wildest designs are on cars that cost half as much.

So what happens? If you want to distinguish yourself from the masses, you realize that you can't beat 'em with flamboyancy this year. The only thing left to do is go



ultra conservative, buy a VW and turn your nose up at the revolting new trend.

Pascal Imperato — Baltimore, Md.

**FAREWELL TO BUICK**

Editor:

Even though a Buick owner for over 30 years I would not consider buying another on account of low, uncomfortable seats, difficulty of getting in and out, and excess length.

This, of course, holds true of other makes and may explain why a large segment of the public declines to buy them.

Fred J. Inglehart — Buffalo, N. Y.

**HEARSE-SIZE**

Gentlemen:

One of the classic cars we own is a 1930 Reo Royale hearse which we use for general utility purposes. Its size is overwhelming—it is more than 19 ft. long and more than 6 ft. high.

Imagine, then, the shock we received the other night when we parked outside a local restaurant, next to a 1959 Oldsmobile. To our amazement, the Olds was just as long as our tremendous hearse!

Mrs. Eugene I. Roe, Jr. — Greenville, N. H.

**SAFETY SUGGESTION**

Dear Sirs:

To prevent crushing in case of an accident where the car rolls over, I think it would be practical and feasible and would add to the safety of the passengers if the manufacturers would put roll bars in convertibles and hardtops.

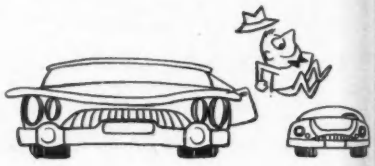
Such a bar could be concealed between the roof and the inside upholstery and could be extended down to the frame through the window posts.

Ted Meyers — Bowmansville, N.Y.

**GAS PAINS**

Dear Sir:

I just sold my 1950 Buick Roadmaster with 86,000 miles, and the car ran like new, burnt no oil and looked as good as any '59 Bentley. Why did I get rid of it? For the same reason thousands of others are parting with their big, solid, reliable American cars—



economy. I got nine miles to the gallon; gas is 35 cents a gallon here.

People are becoming aware of the fact that there are other things to do with money besides buying a $4000 car and 35-cents-a-gallon gas. Cities are spreading out and highways are getting better. More people are driving, and the more you drive, the more you feel the gas bite.

I spent $65 for gas from Chicago to Los Angeles with the Buick, and my friend spent $15 in a Karmann-Ghia.

Frank W. Honey — Chicago

**ECONOMICAL . . . BUT!**

Dear Sir:

The very serious defect of most European cars is their relatively low compression ratios and hence low efficiency. European cars for the most part are economical to operate but are not nearly as efficient as the horrendous behemoths from Detroit. The economy of European cars is merely due to their small piston displacement and nothing else.

European fuels are not only three to four times as expensive as ours on a comparative earning basis but are quite poor in quality, there being no fuels readily available of real high-octane rating. Hence even if their compression ratios were raised to get better efficiency and true economy, it would not be very practical because the Europeans could not afford to buy the necessary high-octane fuel.

Furthermore, a car like the Volkswagen, though quite economical to operate, is very wasteful thermo-dynamically; it should be getting 70-80 mpg with its tiny displacement. I doubt very much that the efficiency of the Volkswagen can be raised, because I do not believe that its engine can stand up under the stresses of even a moderately high compression.

Joseph Lebowich M.D. Sarasota Springs, N.Y.

**AUTOMOTIVE DARWINISM**

Gentlemen:

In 1949 a truly ideal situation existed—where the low-priced cars were smallish, economical and uncomplicated; the high-priced cars were large and in most cases

luxurious; and the medium-priced cars were in-between. With the procession of mechanical do-dads, some of which were necessitated by design evolution, things were thrown out of balance. Low-priced cars, as they became more accessory-laden, finally came to be known as the *"so-called* low-priced three."

The evolution of cars seems to be closely tied to the advent of the sportscar. In 1949



the sportscar was an unusual thing; however, their particular charms won over more and more people until finally a genuine sportscar market existed. The acceptance of these cars with their lowness, performance, and sleek appearance resulted in an attempt at imitation by American manufacturers. Finally the whole line became low and sleek.

By introducing the small cars, the manufacturers can again give us what we had in 1949.

James F. Williams — Portland, Ore.

**SAME JUNK IN SMALLER HEAP?**

Editor:

Constant change of design, engine requirements, and windshield size; suspension systems that sometimes work, sometimes don't —all work toward the constant frustration of owners of the Big Three cars. More attention is given the size of the tail light lenses than



safety factors, such as sharp steering and fade-proof brakes!

Newly heralded "advancements," such as dual-drive differentials, self-adjusting brakes, center point steering, finned brake drums and unit construction, have been enjoyed by owners of the independent-make cars for years.

The Big Three "small" cars will be the usual slapped-together mess that the rest of their products have been. Tremendous advertising will, of course, make them a hit.

G. F. Reynolds — Denver, Colo.

**NO ADMITTANCE**

Dear Sir:

I have been told that any person owning a 1959 Chevrolet will be refused entrance to the Ohio Turnpike. They tell me this is because at a speed of 50 mph or more, the wind gets under the rear fins and tends to lift the rear of the automobile from the ground. This condition would seem to make braking of the car almost useless, and also creates a danger to all persons concerned.

David L. Ritter — Pittsburgh, Pa.

*Really, now! —Ed.*

**CONNECTIONS**

Sirs:

I wonder how many car owners have checked personally the connections at the lower end of the steering column for worn-out lock washers and/or cotter keys. Such things wear out, become annealed, and inefficient mechanics can slip up on a fast assembly line.

Perhaps many a "center-line jumper" head-on collision was caused, not by drinking, but by bad connections.

Eber Lewis Kelley


# GERMAN MADE

Germany's popular precision-built car, Opel offers refinements unique in a car priced so low. Opel Rekord 2-door sedan is a practical family-size, economical small car with American big-car ideas. U.S. sales of Opel have increased faster in 1959 than any other imported car.



# AMERICAN STYLE

Opel Caravan wagon has room aplenty for a family of five and vacation gear, too. Fold down the wide rear seat and get nearly 6 feet of flat cargo space for a ½ ton load. Get Opel's illustrated brochure at your Buick Dealer's.



# THIS IS OPEL

**THE BIG SMALL CAR BUILT IN GERMANY BY GENERAL MOTORS**

Up to 30 miles per gallon. 56 horsepower, 4-cyl. engine. 174 in. long, over 5 feet wide. Standard 3 speed shift. Manufacturer's suggested retail prices P.O.E. New York*—Opel Rekord 2-door sedan $1987.50, Opel Caravan wagon $2292.60.

*(Including heater, defroster, turn indicators, delivery, handling, Fed. excise taxes.) Transportation charges, state, local taxes, accessories and opt. equipment inc. whitewall tires additional.

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# BUICK DEALERS

# Driving Around WITH THE EDITOR

**NEARING COUNTDOWN TIME** . . . Ready . . . Ten . . . nine . . . eight . . . seven . . ." Looks almost as if it could be a futuristic space vehicle, doesn't it? (below). Actually, it *is* futuristic—a "levacar" designed by Dr. Andrew Kucher, VP of Ford Engineering and Research "for ground travel in the 200-500 mph range."

Kucher foresees the day when the wheel will have reached its top speed capabilities. Looking forward to this day, he came up with the idea of a wheel-less car that rides on a thin film of air a fraction of an inch off the road. (Two of these shiny-surfaced levapads can be seen under the car, while the detail photo and drawing explain the principle.) The "road" surface will have to be much smoother than present surfaces and will most likely have to be steel plate or even rails.

Kucher says, "We look upon the levacar as a new form of high speed land transportation . . . for fast trips of distances up to 1000 miles." In other words, levacars using reactors, gas turbines or jet engines will be an *additional* form of transportation. They will *not* replace today's cars, which Kucher does not foresee ever approaching speeds that would make the wheel obsolete. He does envision the day when you'll step into a levacar in Detroit and one hour later step out in Chicago (about 300 miles away).

What will it be like? It's hard to predict exactly, but here's what it was like to ride in the demonstration levacar (which could be called a prototype in loose terms) at the Ford Rotunda in Dearborn, Mich.:

The operator pushed a button on the hood, the plexiglas canopy swung back and I stepped inside. With the canopy closed, I settled myself in the comfortably padded seat, fastened the seat belt and waited for the operator to flip the switch on an outside control panel. From within I could hear the motor winding up, the air forcing its way through the levapads and the levacar freeing itself from its resting place on the steel surface. When the operator moved the "throttle" forward, the air went rushing out through two blowers, propelling the levacar forward.

A guiding arm attached to the left side of the car kept the levacar from leaving the circular track of flat steel as it picked up speed. (On this particular road surface, the car gave a "rail-clicking" ride because of the joints that were necessary; on future tracks or rails these joints would be smoother.) Maximum speed of this levacar is about 20 mph. David J. Jay, senior development engineer, says, "Our calculations show that about 50 hp will be required to levitate one ton of vehicle weight. Once free of the roadbed, however, it will take only about 40 additional hp to move it 100 mph."

The levacar is probably the "dreamiest" and most remote of any of the projected vehicles or powerplants featured in this issue. This even includes the "air cars," or ducted fan vehicles, which are supported by reaction to air jets. It sort of sets the mood of this issue, though, in that we're discussing new modes of transportation. And they're exciting ones too, ranging from gas turbines through electric cars to air cars. We had lots of fun assembling these special reports and hope you'll enjoy reading them.

* * *

**FOR A NUMBER OF YEARS** I have been of the opinion that a fully automatic transmission would be the biggest sales boost any one of the smaller economy imports could get. (And I'm not talking about the automatic *clutches* which are presently available.) Until now, no manufacturer seems to have been able to design an automatic that would not rob lots of power from the small engine to which it would be coupled. Now, that's all been changed.

While I was in Europe I had the opportunity to drive a prototype car in the 95-inch-wheelbase class that was equipped with an automatic transmission. What made it particularly intriguing is that the car is powered by the same four-cylinder, 52.5-hp engine that's used with the standard gearbox. Neither performance nor economy seems to suffer.

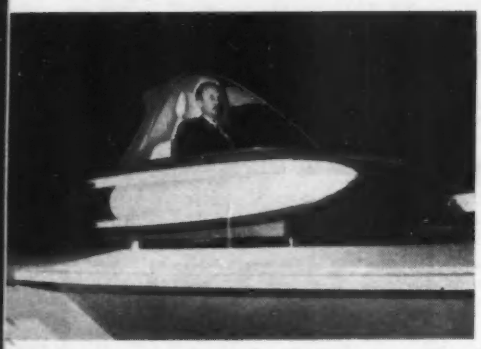
The transmission is electrically operated, has three forward gears, a quadrant position that allows you to use the intermediate gear for braking on downgrades, and reverse. Ordinarily, and as on any Detroit car, you start the car while the transmission is in neutral, then drop the lever into the drive gear, push the throttle and never touch the lever again.

They still have a bit of work to do with the transmission, for the first upshift is quite noticeable. The manufacturer promises that this will be smoothed out before the car is put on sale with the transmission. The second upshift is smoother and is similar to that of a Hydra-Matic.

The price will probably be pegged at under $150. When you add this to the present car price of under $1700 it would seem to make a highly desirable economy import. Announcement will be around September or October.

* * *

**ONE OF THE THREE CARS** we took on our city-mountain-desert course last month was a Rambler. Reports on the other two cars—a Studebaker Lark and Borgward Isabella—are on pages 14 and 74. (Though the cars are all *practical-size* cars, they are dif-








## Air Flow

*In elementary form, a levapad is a flat, round plate with a hole in the middle through which air is pumped. The pressure causes the pad to lift off the ground, keeping a cushion of air between road surface and vehicle. A card inserted between the two had a tendency to be blown out, indicating that the pad was free-floating.*

ferent enough in concept that a strict comparison of them would be unfair.) Notes on the Rambler follow:

My first reaction to the Rambler was that it was much larger than it is. This was possibly because of the fact that I had just gotten out of the smaller Borgward to drive it. In actuality, it's not too much smaller than the average of the Chevy-Ford-Plymouth, but that extra foot helps in traffic maneuverability and parking. Vision is good, from a fairly high seat position.

It's a comfortable car to drive, the automatic transmission making it even easier. Of course, any slushbox is going to cut down on gas mileage and particularly when it's coupled to an economy six-cylinder engine that's not noted for power (a 127-bhp plant that takes 18 seconds to push the chassis from a standstill to 60 mph). Fuel economy can be anywhere from a minimum of 15.0 mpg under a strenuous run such as ours, to a maximum of 22.96 mpg, such as Les Viland got on the Mobilgas Run.

The Rambler's ride is smooth, absorbing dips about as well as any other car in its category; it doesn't have the ride of a Cadillac, nor does it have its price tag. It goes through corners adequately, having definite understeer characteristics, requiring more working to get it around if you're traveling fast. In tight, bumpy corners it chops—you can feel the long coils and tube shocks working—but it doesn't roll excessively or get out of control. It's definitely an easy-to-drive, practical-size car.

* * *

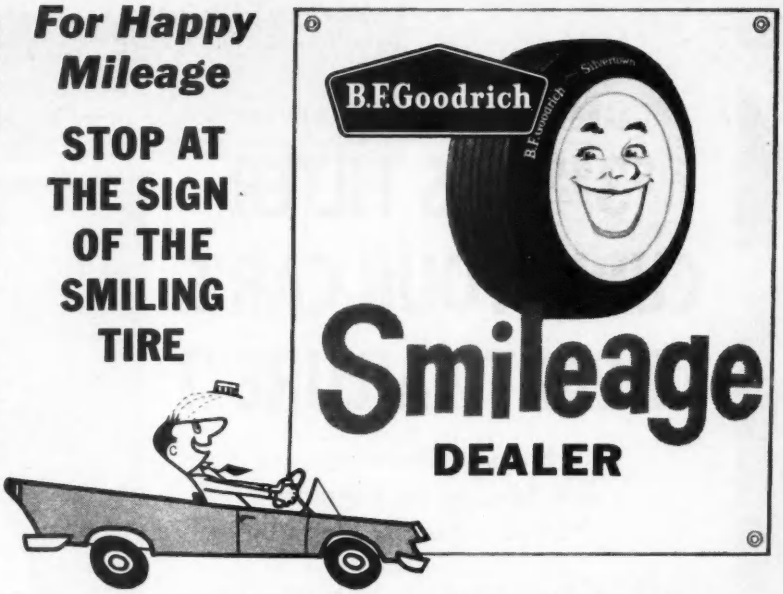
**SINCE THE INCEPTION** of our MT Seal of Approval program in February, so many products have been coming into our offices that it has been impossible to acknowledge their receipt quickly, to determine whether or not we can perform a proper use test of them and to then schedule them for a specific issue. As a result—and because in some instances attempts are being made to coerce us into testing products we should not be testing—we are now forced to set up a new procedure to determine which products we *will* test.

First and foremost, the product use tests are intended as a service to our readers. The purpose is to evaluate the product in the same way that a reader might if he were to purchase the product and use it on his car. It is important for us to determine if the product lives up to the manufacturer's claims. When it doesn't, we feel we have the right to say so. If a manufacturer disagrees, we want this known *before* we test the product.

For this reason, we will now accept a product for test only *if* we have the manufacturer's agreement to publish our findings—regardless of the results. Only in this way can the MOTOR TREND Seal of Approval have a real meaning.


**For Happy Mileage**

**STOP AT THE SIGN OF THE SMILING TIRE**




**Relax!** Drive worry-free on B.F.Goodrich Silvertowns. They're lab-tested, road-tested, time-tested. We do the worrying for you! So have fun. Enjoy trouble-free mileage on the quality tires chosen for new cars year after year. Get top value, get Smileage! 4 tires, $4 down!

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**chrome side pipes and lakes pipes**

***Easy To Install***

**SIDE PIPES**
in 3 lengths with *exclusive* ADJUSTABLE TIPS

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18", 31", 87" with *removable* CHROME BLOCKING PLATES

*Patterned after racer's famous Lakes Plugs . . . these CHROME beauties add flash to your car. Side pipes replace conventional tail pipes. Lakes pipes have blocking plates, removable for competitive driving. Set the pace in your crowd!*

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**MUFFLER DIVISION**
DEPT. MT-8, RUBY AND ARMITAGE, MELROSE PARK, ILL.

NEW FROM CARTER CARBURETOR

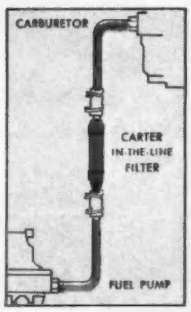
# $3.95 GAS FILTER CURES YOUR CAR'S "HEART FAILURE"!

**Prevents Flooding and Stalling By Keeping Your Gas Supply Clean**

Until recently there was no really effective way to protect your car's "heart", the carburetor, from tiny specks of gas-tank dirt that cause flooding, stalling, and poor performance. Then Carter Engineers got busy on the problem.

Result—the new Carter In-The-Line Filter—with an exclusive ceramic unit and Magnatrap® that stop dirt and metal particles .0012 inches and smaller! You can install it in minutes just by removing 4¾" of the fuel line and fitting it in place. Neoprene hose and clamps supplied.

Give your carburetor a break—prevent flooding, stalling, and carburetor 'erosion'. *Install a Carter In-The-Line Filter today . . . available at service stations and garages everywhere.*




*Install between fuel pump and carburetor. Three sizes fit all cars.*

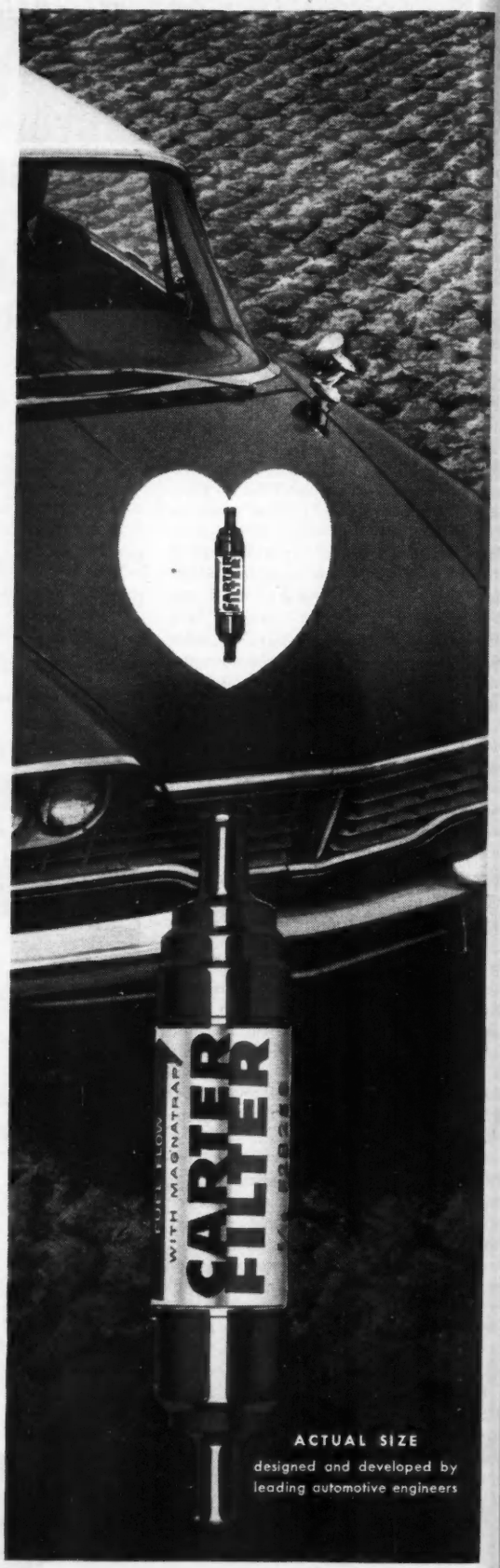
**FREE!** Easy-to-read booklet with more details about how the new Carter Filter works and how it protects your carburetor, boosts mileage and performance! Write Dept. No. 820—MT-8.

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designed and developed by leading automotive engineers

# Detroit NEWS AND VIEWS

by Bill Callahan
Detroit Editor

SMALLER CARS: FACTS TO DATE

Public admission by the Big 3 that small cars will be available this fall means that for first time since the war, buyers will have a wide choice of cars to choose from. There's really not much new to report, but here is an overall picture of facts to date:

Cars will debut starting early in Oct., with Corvair probably first, with Ford's Falcon possibly moved up to Oct. 1, but more likely out mid-Oct., and Valiant early Nov....Chevy will have to fight an advertising battle to sell its engine in the rear, for already Ford and Chrysler are pooh-poohing the idea. Some of Chevy's ammunition: elimination of driveline tunnel, more efficient interior seating, greater room....All three cars will be unitized construction, permitting lower rooflines and adequate headroom.... All will have sixes, though Corvair will be a flat six (horizontally-opposed, with three cylinders on each side). Valiant's engine will be tilted 30 degrees from vertical to lower hood. Tuned leads from intake ports to manifold are said to give 10% more torque. Corvair engine will be aluminum block with cast-iron sleeves. Others will be cast iron. All will develop close to 90 hp and offer good fuel economy....All cars will be close to size of Rambler American and Studebaker Lark. Corvair is 180 ins. overall, Falcon is 181, Valiant 183....Price will be in neighborhood of $2000.... For the present, only Falcon and Valiant will have complete lines, consisting of 2-dr. and 4-dr. sedans and wagons. Corvair will offer only a 4-dr. sedan now, a more complete line later, possibly even a GT coupe.... Suspension will be conventional on Ford and Chrysler, not so on Chevy. Corvair will have independent rear wheels because of engine location and transmission being mounted in rear....

OTHER SMALL CARS TO COME?

If you've heard rumors about other small cars, it's possible you may have heard the truth, which is this: Dodge will have a smaller car for 1960. It is the Dart, on a 118-in. wheelbase. Exterior styling will be quite different from larger Dodge, which will continue on 123-in. wheelbase. This is in line with Chrysler's new divisional setup, under which Dodge markets Dodge cars and trucks, Plymouth-DeSoto divisions market Plymouth, DeSoto and the Valiant, and Chrysler-Imperial market their cars....Current, well-founded rumors are that Ford is preparing a second smaller car, larger than the Falcon, to be marketed through its M-E-L Division. Don't look for it until 1961, at least....GM also reportedly has a smaller, front-engined line, to be sold as three separate makes through Buick, Olds and Pontiac dealers. Buick currently is tooling an engine line to build a smaller 3-liter V8, largely of aluminum, to power such a car....

MORE NEWS ON UNIT BODIES

As previously reported, all Chrysler lines for 1960, except Imperial, will have unit bodies...."Big" Fords may have it in 1961, for MT understands automated lines are now being set up. ...Possible that GM may follow too, which may account for continuance of basic body shells for '60. When they

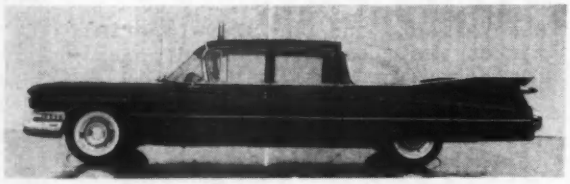
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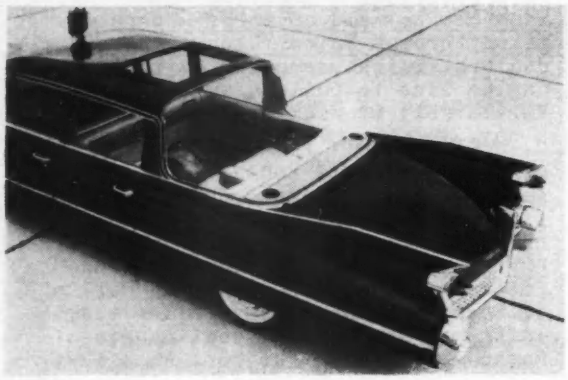
## STRICTLY RUMOR

Flathead engines will disappear in 1960. Not true. Rambler American and Stude Lark will continue theirs.... Ford Motor Co. will drop its Lincoln line in 1960. Improbable. MT is informed by responsible officials that no such plan is being contemplated.... Chrysler will discontinue the DeSoto line. Not true. There will be a '60 model, and Chrysler says DeSoto has a definite place in future planning.... American Motors cars for 1960 will be equipped with pull-down panels in the front seat to protect driver and passenger in event of collision. Doubtful. Similar designs for safety have been recommended by Cornell U., and AM probably would be among the first to offer them; however, 1960 seems too close for such a change.... The Ford Ranchero is being dropped. False. The new offering in this growing truck field will have an aerodynamic look and accurately predicts what you can expect in future Ford styling.... GM has a new V8 that uses four cylinders for cruising and four more for full throttle operation. Both true and false. Though a patent was recently issued to two GM engineers (one former, one still there), design was so complicated that GM officials claim it is a dead duck.

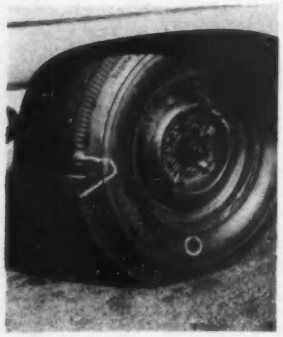
# Detroit NEWS AND VIEWS

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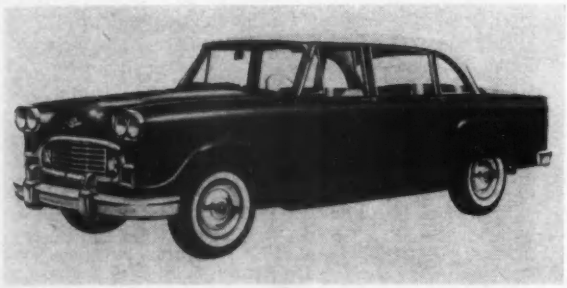




*For Queen Elizabeth's visit to Canada, a Cadillac landau was specially built by GM (Canada). Sliding roof and seats are power controlled, removable plexiglass canopy provides all-weather visibility. If queen travels by air or sea, Cad is flown ahead for her.*



*Cornering, as we know it, has always been considered impossible without the pneumatic tire; however, experimentation by the Dayton Rubber Co. and American Latex may have opened a new area for exploration. A Dayton filled with polyrubber (controlled-density urethane) instead of air, takes saw cuts and rifle shots, still supports car in motion. Initial testing indicated satisfactory ride, good stability and low lateral distortion in speed corners.*



*After 37 years of making only taxis, Checker Motors has a 4-door "civilian" version with longer wheelbase but shorter overall length than the Big Three. Four-door station wagon models are to follow.*

do, look for three separate bodies, rather than one single body for all lines, as in '59 and '60.

TIRES "AS QUIET AS A SPONGE"
Enjay Lab. of Standard Oil of New Jersey recently demonstrated (to Detroit press and auto reps) the first commercial, all-butyl passenger tire with built-in anti-squeal. In a series of hard turns at speed and panic stops from 30 mph the butyls utter only a low, squishing sound. Enjay claims better traction, softer ride, too. Rubber is softer than standard, but manufacturer claims 11% better tread wear. Tires are now being made by Firestone and U.S. Rubber Co.; will be sold through Atlas Div. of Standard Oil.

MORE USES FOR PLASTICS SEEN
Plastics, usually limited to trim and non-stressed parts, may be used more, what with Dupont's announcement of its newest product, Delrin. They hope to be able to use it for such stressed parts as front end steering units, etc.

NEW SEATING COMFORT
A new seat with coil springs molded into polyurethane foam may be the answer to greater seating comfort. Such a device was shown recently by a company in Adrian, Mich. and could supplant present methods of topping springs with foam. Claims are new seat would retain its shape longer....At least one other car manufacturer is reverting back to "chair-height" seats for 1960, too.

NEW TRANSMISSION UNDER TEST
Detroit engineers are interested in two cars in Rochester, N.Y. which are running around with a new "traction-drive" automatic transmission. Inventor C. E. Kraus has been working on it for 20 years and claims it is so efficient that at times it outshines the hand-shift gearbox. Other claims by Kraus: transmits power smoothly from zero to peak; little sign of wear after equivalent of 200,000 miles of use.

BRIEFS
A new version of the successful Dual-Ghia, using Chrysler components and a special body by Ghia of Italy, will make its bow in 1960....Willys has a new 4-cyl., flat, all-aluminum engine. It's 164 cu. in., develops 100 hp. For military use only....The A.M.A. has revived the National Auto Show, this time in Detroit--Oct. 15-23.

RUNDOWN ON THE '60 MODELS
Though the '60 models have not yet entered production, new car fever is high here in Detroit. Watch next month's Motor Trend for what's coming from Detroit in 1960. There are lots of interesting surprises....

# NEW Electronic GLIDE CONTROL*

*Trade Mark

## stops tiring, gas-wasting "PEDAL PALPITATION"

GCC

**First simple, low-cost speed stabilizer engineered for greatest possible gas saving and driving ease in any car!**



**WASTEFUL PEDAL "PALPITATION"** Hundreds of thousands of rpm, gallon upon gallon of gas, *wasted* every day! Figure it out for yourself—engineers estimate waste by multiplying this way: number of miles driven x number of "palpitations" per mi. x useless rpm per "palpitation."

Now, GLIDE CONTROL lets you achieve automatically, with *any* car, exactly what professional "economy run" drivers are famous for—record-breaking fuel savings through precise, even throttle control and fuel-feed! You get any speed you want, without the usual gas pedal "palpitation"—without excessive, wasted rpm—without burning up gasoline needlessly. GLIDE CONTROL is a perfected, precision-made electronic instrument, proven efficient and fool-proof in rigid performance tests by leading engineers.

### GREATLY REDUCES FATIGUE

Another constant aim of "pro" drivers is minimum fatigue, and GLIDE CONTROL can promise you this advantage. It ends the tiring, cramping strain of holding right foot steadily on accelerator pedal. The usual tenseness of long grinds on thruways and much of the strain of local hops can be forgotten for good. Wherever you drive with GLIDE CONTROL, you arrive fresh and relaxed.

### A SPEED STABILIZER

Not a "Governor"

Maximum fuel economy is possible only when the fuel flow to carburetor is unvarying. The human foot can't accomplish this—but GLIDE CONTROL can! Maximum comfort and driving ease are possible only when the right leg isn't kept tense, stiff, fixed to the gas pedal. Manual throttle control can't relieve this—but GLIDE CONTROL can! You get any speed you want with GLIDE CONTROL, and you can hold it for hours without strain. It's not a "governor" in any sense, but an electronic fuel-feed stabilizer. It saves a bundle on gasoline!

### 25% MORE GASOLINE MILEAGE

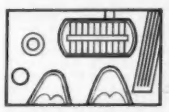
"Pays for itself" is no exaggeration with GLIDE CONTROL. It provides maximum efficiency and uniformity of fuel-feed to carburetor, which results in more ideal combustion and maximum power from every drop consumed. You can't avoid gas pedal "palpitation" when your foot controls gas feed—every fluctuation means wasted rpm, useless gas consumption. But with GLIDE CONTROL, you keep the fuel-flow uniform and any gas will produce more miles per gallon. It increases gas mileage up to 25%—pays you back its full cost within a few months!

### SAFE TOE-TIP CONTROL

You are in command every split-second, with GLIDE CONTROL. Hands never leave the wheel, eyes never leave the road—because this speed stabilizer is "cut in and out" by your toe-tip, *not* by a hand switch on the instrument panel. It works with a left-foot floor-button placed a little to the right, and above, the light-dimmer button. Touching the brake pedal "cuts it off" automatically. It requires no change in driving habit, no unfamiliar footwork. Driving with GLIDE CONTROL is as simple, natural, and familiar as dimming the headlights.

### HOW IT WORKS

You accelerate to any desired speed, then "cut in" GLIDE CONTROL with your left toe. It will hold your speed at the predetermined rate indefinitely. Once speed is set, your right foot is free, relaxed, and just



that much more "ready" to hit the brake pedal when need be. GLIDE CONTROL holds speed constant by precisely measuring fuel-flow. It functions until you either touch the floor-button again, or apply the brakes. The instant you touch the brake pedal, GLIDE CONTROL "cuts out" and throttle control becomes manual.

### COSTS UNDER $30.00

GLIDE CONTROL costs under $30.00 on *any* car—installation is quick, simple, low-cost. You *save* the sum total in just a few months. Performance-proven by leading automotive engineers and testing laboratories. Ask about GLIDE CONTROL at your automotive dealer, garage, or service station.

**DISTRIBUTORS, JOBBERS, NOTE:**

Get the details about how GLIDE CONTROL is becoming a "hot" automotive item—it's a story you can profit by!

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**AWARDED MOTOR TREND SEAL OF APPROVAL**

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Please rush full details on GLIDE CONTROL performance.

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Address _____ ☐ Retailer
City _____ State _____ ☐ Private car owner



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Restores lost engine power

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Reduces gas, oil costs

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dissolves the most stubborn carbon deposits, resins and varnish residues at valves, valve stems and guides, under rings, cylinder rims, bearing surfaces, carburetor jets!

SAFE WITH ALL OILS detergent or non-detergent.

NON-TOXIC, NON-CORROSIVE not harmful to engine in any way.

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NO INJURIOUS RESIDUES — acts as combustion chamber cleaner.




UNDOUBTEDLY THE SAFEST, MOST EFFECTIVE ENGINE CLEANING AGENT EVER DEVELOPED!!




2. HRL...

full-time lubrication at hot spots with spectacular new lubricant. HRL is a pure blend of petroleum and HRL Graphite (Electric furnace, molecules of graphite — finest lubricant known according to many automotive engineers)! A microscopic film of Colloidal Graphite adheres to hot spots and prevents sticking valves and freezing rings. Quiets valve lifter noise, reduces drag and boosts power. Improves compression and increases vacuum! ADD ONE CAN EVERY OIL CHANGE!

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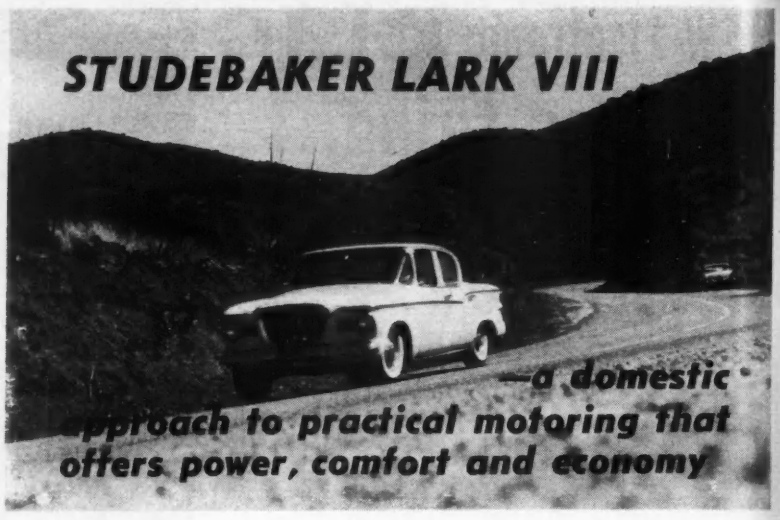
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**TESTING CARS** on the manufacturer's proving grounds is fun and it is informative. Most of the time the setup is ideal, with good driving conditions and a staff of factory engineers on hand to make adjustments and dispense information.

Studebaker-Packard's South Bend, Ind. course is located in one of the few hilly sections of that part of the state, and while it is more than adequate, the atmosphere is more of a "you're on your own" than any other way we could describe it. Our first drive of the Studebaker Lark was the routine one where we had a chance to tour the course to our heart's content and congratulate Harold Churchill on what we believed to be a good and needed addition to the American automobile market. Later that week, looking for a different type of story, we managed to ride with the night shift test drivers in the rain. This cinched it—we were sold.

Many months have passed, and many cars have been sold. It has often been said that the way to economic suicide for American car manufacturers was the production of a practical car. The Studebaker-Packard Corp. is about to make someone eat those words, for their sales in the first quarter of 1959 were 51 per cent greater than their entire 1958 market. There is little doubt that Studebaker's "smaller" practical car was responsible for this fantastic sales increase.

One thing is obvious: the buying public, interested in a practical car, is not buying price. These cars, just because they are smaller, are not cheap. But large or small, quality costs money. This segment of the automotive market, sparked by the Studebaker Lark and American Motors' Rambler American, has had a great deal to do with the Big Three's decision to produce a vehicle in the practical class.

The customer is buying the product but in our own mind, is the Lark as good as we thought it was nine months ago?

The test car, a four-door sedan with V8 engine and automatic transmission, had 10,000 miles on the odometer as we joined the other "smaller" cars of our caravan to gas up for a cross-country run. When you get into V8 engines and automatic transmissions, this spells gas consumption, but as this was not an economy run, but rather a drive for test and fun, no attempt was made to featherfoot fantastic miles per gallon just because the Lark is a smaller car. In fact, by the time we were finished with our 163-mile desert and mountain junket, we were more convinced than ever that we did not have a car that was substandard in size—just a real sensible vehicle with plenty of performance and real good handling on up- and down-hill mountain curves and high-speed stability on the straight stretches.

Excessive front and rear overhang have little influence on interior seating measurements, in many cases impair handling, and most certainly pose disadvantages in parallel parking and squeezing into the garage at home. Weight and overall length are two things an automobile needs the least. There are those who feel the need for a massive automobile to move the family and their belongings on that once-a-year vacation, but the inconvenience of traffic and parking, and the high fuel consumption are too high a price to pay for the rest of the year's around-town driving with one or two passengers.

The Lark's center point steering, 172.4 square inches of brake lining, and a sensible weight distribution that is not destroyed by excessive front and rear overhang, relieve the need for power-assisted controls. Even the automatic transmission offers stick-shift downshift features when desired. When in third gear, flicking the control quadrant into L at any speed over 12 miles per hour will result in a downshift to second, great for downhill braking and the climbing turns of mountain roads. This sort of driving, plus many stops for picture taking, still produced 16.2 miles per gallon for the test trip.

Close examination of paint, detailing, door and decklid fittings, interiors and trim revealed good quality control. Production engineers at the proving grounds last fall were emphasizing this important point for their cars, and they have apparently been successful for the Lark has been finished with detail equal to many luxury cars.

This was not a new car, but after the 10,000 miles on the odometer, it was tight and solid and a real pleasure to drive. We still like the Lark. —Charles Nerpel

IF YOU ARE INTERESTED IN AN IMPORTED CAR GET THE ANSWER TO THESE TWO QUESTIONS

#1 HAVE YOU THE NEW 1100[B] GOLIATH




#2 HAVE YOU EVER A CAR *WITH FRONT WHEEL DRIVE...?*

Front wheel drive gives a big car feel and greater safety to the driver and his passengers . . . Goliath's 46 H.P., 4 cylinder, 4 cycle airplane type engine gives the car pound for pound one of the most powerful and economical-to-operate engines in the world . . . try a Goliath before you buy any car . . . and you're sure to buy a Goliath.

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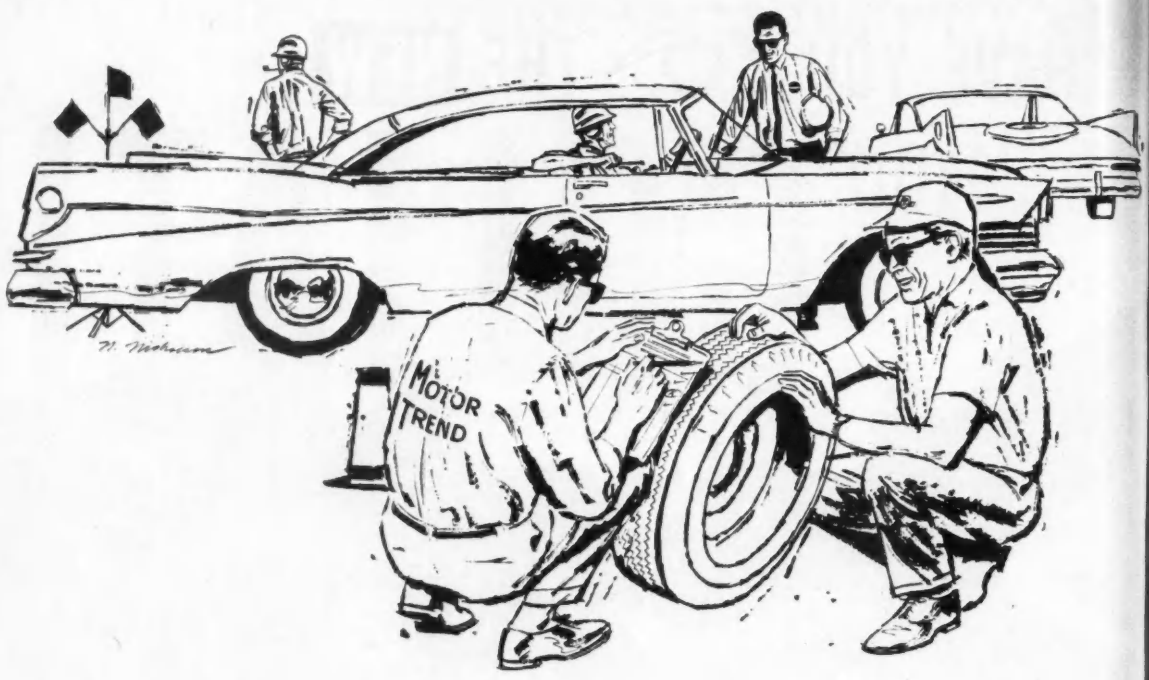
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USERS SAY—

"With the very best new tires I can get no better than 6,000 miles under my usual mining road driving conditions. The Turnpike 100s have 8,000 miles on them, and I would estimate they have another 8,000 miles to go before they would need another capping. I'd say that for a car that's going to be slammed around on rough roads or tight turns, this is the finest retread on the market."

"The tire hangs good to the road. As far as handling, it's just a heck of a good product. Last time I checked I had nearly 4,000 miles on them and they are only down 1/32 of an inch."

"I found my new car handled beautifully at top legal speeds, and cornered much better than with the original tires."

The design features that make the **TURNPIKE 100** "different"



More bearing surface than other tires have—more rubber on the road. Result: Quicker starting and stopping.

Grooves on shoulder reduce tire weight without reducing the amount of rubber on the running surface. Result: Cooler running.

Like other retreads made with modern, patented Lodi equipment, they are precisely centered and are cured at the road-running radius. Result: Superior balance and mileage.

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**SUPER MOLD CORPORATION**
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# Overseas NEWS REPORTS

ENGLAND
Two leading British manufacturers are planning to take the plunge into the minicar market with new baby models. BMC has given the go-ahead to a car costing less than the Austin A-35 and the Morris Minor 1000. Rootes has been testing prototypes smaller than the Hillman. Indications are an air-cooled engine located in the rear....At this writing, Le Mans is scheduled as a test ground for the new TR3-S, with double overhead cam engine, four-wheel disc brakes, possibly deDion rear. If produced, it will be an additional model at a much higher price, not a replacement for the TR3-A....Tony Vandervell offered Fangio close to $15,000 to take the wheel of a Vanwall. Fangio replied his retirement was final, and added, "I wouldn't start racing again if you paid me my weight in gold"....Rolls-Royce is thinking in terms of a new Phantom V, a super-luxury very-limited-production model. At the same time, significant penetrations are being made into the American luxury car market. There are more orders than there are Rolls-Royces to fill them....Rover, a moderately-priced luxury car, is making a vigorous push for a share of the luxury car US market, plus a share of the utility market with their Land Rover jeep-like vehicles....The Montagu Motor Museum has scheduled an interesting rally for vintage fire appliances made prior to the outbreak of WW II. Includes a concours....In addition to the team B.R.M.'s, one other car will be made available. Probably driven by Stirling Moss or Ivor Bueb....Stirling just acquired a Facel Vega for travel between races in Europe. His comment, "The Facel is the quietest car I know at over 130 mph."....

ITALY
Another Farina, Dr. Giuseppe Farina, has opened a styling studio to provide body designs and models for car manufacturers....The 43rd Targa Florio was won 1-2-3-4 by Porsche....Pirelli Tire of Milan is making a determined return to US sportscar racing by appointing American dealers....

FRANCE
Citroen has changed its emblem. Now uses a white oval as background for the famous chevrons....To cope with the American proclivity for power accessories, Renault's Dauphine will be changed from 6-volt to 12-volt electrical systems. As for the Caravelle, 12,800 orders were placed before specifications, prices or delivery dates were released....

SOUTH AMERICA
Peru's "Lima-Ica-Lima" race was won 1-2 by Volvos for the second year in a row. Average speed over the 380-mile course was 90 mph....An agreement has been reached for the manufacture of BMC vehicles in Buenos Aires....

HOLLAND
Austin A-40 and A-55's will be assembled at Amersfoort, where Morris's are already being assembled....

SOUTH AFRICA
A stock Borgward Isabella touring sport sedan won the Mobilgas Economy Run between Capetown and Port Elizabeth, averaging 39.14 mpg....

DENMARK
Another Borgward Isabella coupe won the GT class of the '59 Caltex Rally, an economy run held by the Danish Automobile Club. Average was 35.7 mpg.

IRELAND
A new car from Belfast has some novel specs., such as four speeds forward and no reverse. To back up, turn ignition to "reverse," and the one-cylinder German-made engine runs backwards, giving four speeds in reverse. Has glass body, 10-foot length, weighs 600 lbs....

GERMANY
Opel is building a bigger Kapitan with six-cylinder engine and automatic transmission....Daimler-Benz is starting to use chassis and steering linkage joints requiring no lubrication....A smaller DKW that looks like a small Anglia with hooded headlights is in prototype form. Engine is two-stroke 741cc, gearbox four-speed all synchro, top speed 70 mph....It is believed that Volkswagen have developed new prototypes of 900cc and 1600cc displacement. They're for if-and-when interest in present models should wane....Lloyd is introducing a new 900cc four-seater car with 38-hp flat four engine to compete with VW. Price is only slightly higher, and Lloyd is stressing styling, space, comfort....Agreement has been reached wherein Mercedes-Benz will distribute DKW in the United States....Porsche has terminated its exclusive US importing and distributing agreement with Hoffman-Porsche Car Corp....

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# Volvo 122-S

**"No detail as to comfort, safety and reliability has been overlooked."**



**THE FIRST STEP** toward The Modern Look, by Volvo, was the introduction to this country of the first good-looking—in a modern sense—sedan to be shipped to these shores by the high-efficiency "Aktiebolaget Volvo," Gothenburg, Sweden.

It's a matter of record that this automobile plant can truthfully claim superb Swedish engineering. Until now, though, few cars lacked as much in overall attractiveness as did the first PV-444 and its follow-up, the PV-544. Yet even in the days of the "old" 444's three-speed gearbox, it took even the non-enthusiast only minutes at the wheel to respond to unequalled performance and handling characteristics, as well as overall comfort, in the car. No few immediate buyers chortled to themselves with glee as they bombed past racy-looking roadsters whose owners in turn could only rub their eyes in perplexity as that fastback two-door sedan disappeared into the distance.

Now, with almost identically the same performance, the Volvo 122-S comes to market complete with four doors, a roomier interior and full-size luggage compartment, and with a look so charming in comparison to its predecessors that it causes unobservant beholders to miss identification. A premium forerunner to the startlingly attractive Volvo Sports, the 122-S rates unqualified approval in every respect. No detail as to comfort, safety and reliability has been overlooked.

In this type of impressions testing, lacking the full road treatment and technical data gleaned from comprehensive procedures, we attempt solely to convey an opinion of the car after spending a number of days driving under as many varied traffic conditions as possible. In the 122-S our time was a bit limited, but in less than 100 miles on the clock, recorded mostly on Staten Island and in Manhattan I found sufficient opportunity to get fully acquainted. In an earlier report on the car in its two-door version (MT, Oct. '58), superlatives flowed and it was termed "one of the hottest imports in the salesroom as well as on the highway." Since the only appreciable difference between this car and the 122-S is in the body styling, which is the distinct improvement, all that can be said would be repetitious.

Priced at $2799, p.o.e. New York, the car probably won't make the company a dime in extra profits. Structurally—complete to the all-synchromesh, four-speed transmission—the car bears little change. Lubricating arrangements are improved, the car is rustproof in all types of weather, foot pedals are suspended, there is a new, improved rear wheel suspension and extra-efficient brakes. Gas consumption remains in the high 20's, depending on how the car is handled. Safety belts are fitted, of the type that crosses the chest.

With the prospect of the elegant Sports Coupe from Volvo next year it stacks up that competitors in the under-$5000 class will get a real run for their money—on the highway as well as on the race course—in the 1600cc groupings.

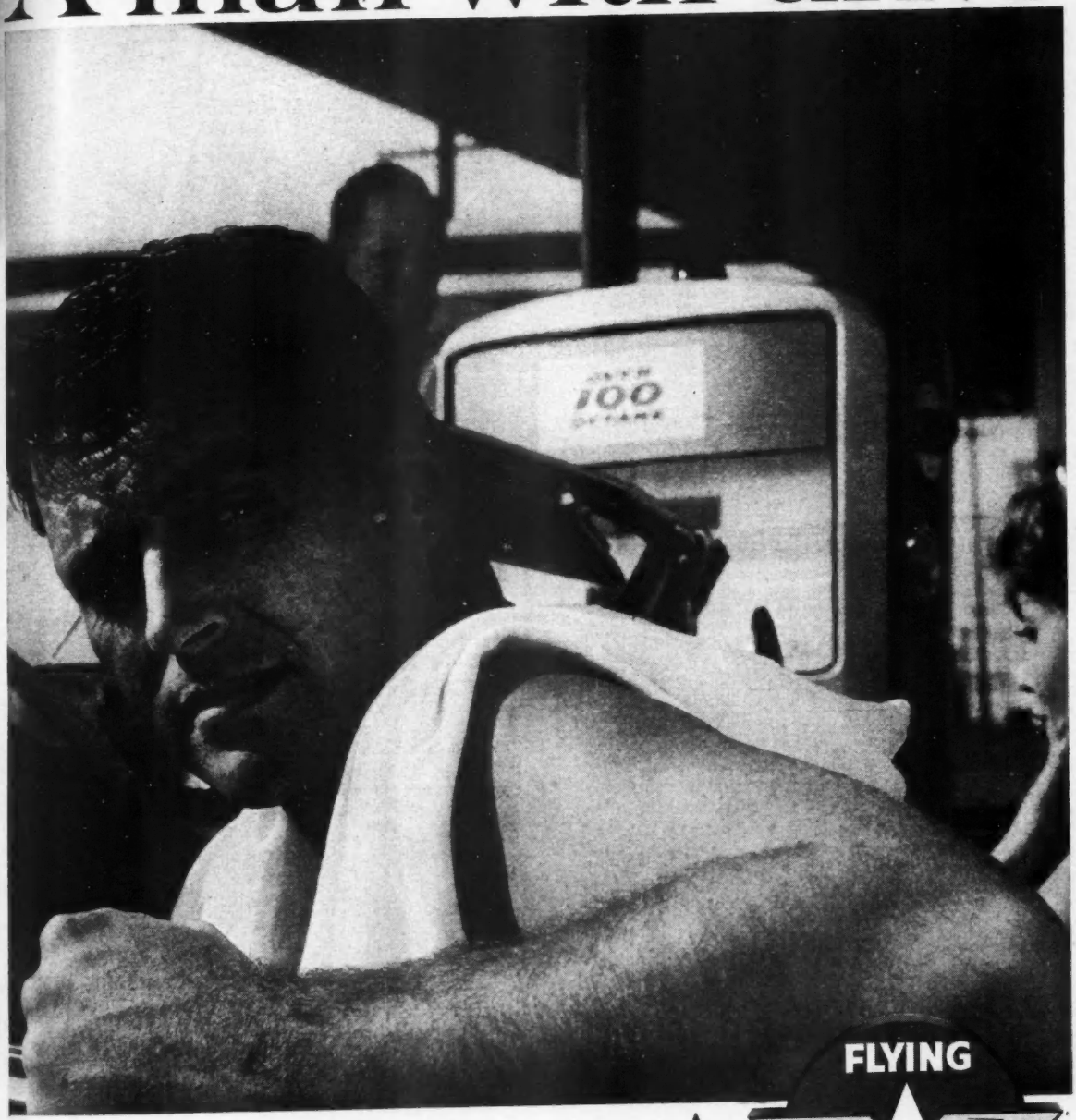
**—Steve DaCosta**





*Lines of 122-S have sports motif. A few details have been altered from the PV-544: pedals are pendant suspended, rear suspension and brakes have been improved, seatbelts of chest crossover type are fitted. Gearbox, naturally, is four-speed all synchromeshed.*

# A man with drive




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# Tomorrow's TURBINE Cars

*Is the gas turbine the engine of the future? Or is it electric motors, or perhaps jets of air? Here are special reports on these three sources of power, and how they feel behind the wheel.*

*by Bill Callahan Detroit Editor*

**HOW NEAR ARE GAS-TURBINE** passenger cars is a question that pops up regularly. The facts are that turbine-powered cars are a reality today, but the mass application of turbines as a substitute for piston engines for passenger car use may be as little as five years, and as much as 10 years, away.

A second, and probably more important question, is: What are the advantages of the gasoline turbine over the piston engine? There are many:

It is felt that future gas turbines will be able to approximately double the power or torque of a piston engine of the same weight, or put another way, a turbine producing the same horsepower as our present engines would weigh half as much.

Turbines are less selective in fuel requirements and can be made to operate on almost any combustible liquid (unleaded gas, kerosene, jet-engine fuel, or light diesel fuel).

Turbines, because they have no reciprocating parts such as connecting rods or pistons, are smooth and free of all vibration.

Turbines require only one spark plug or igniter. There is no distributor, no fan belt or many other such items.

Turbines have only about one-fifth as many parts as a piston engine.

Turbines require no cooling water or anti-freeze.

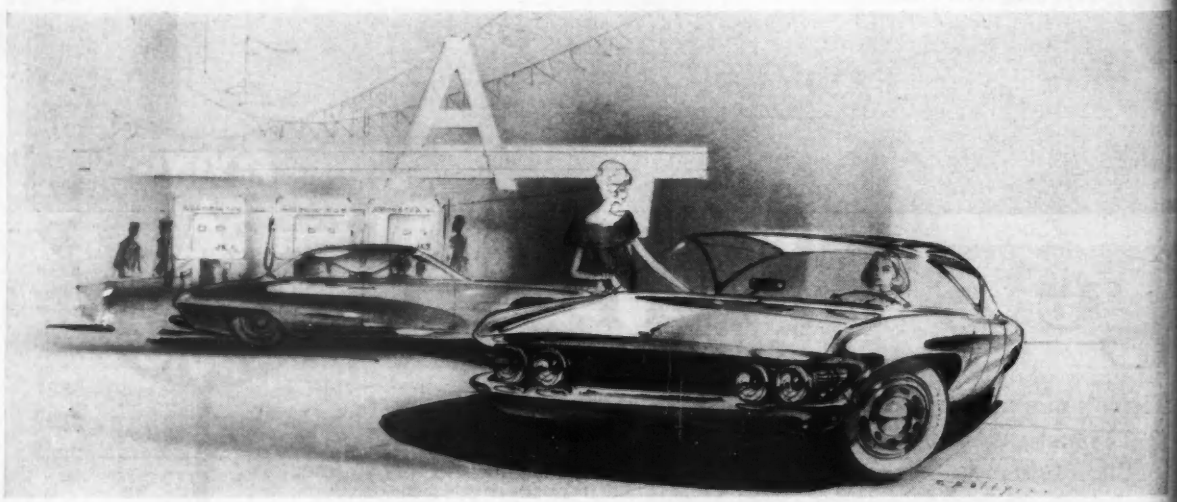
They are more compact in size than an equally powered piston engine.

What are some of the chief problems of turbines that designers must solve before they can be used in passenger cars?

George Huebner, executive engineer at Chrysler, who has directed the turbine program there says, "The application of the gasoline turbine to passenger car use presents no single, specific problem. Rather it is a question of perfecting principles and components that have been proved up to now."

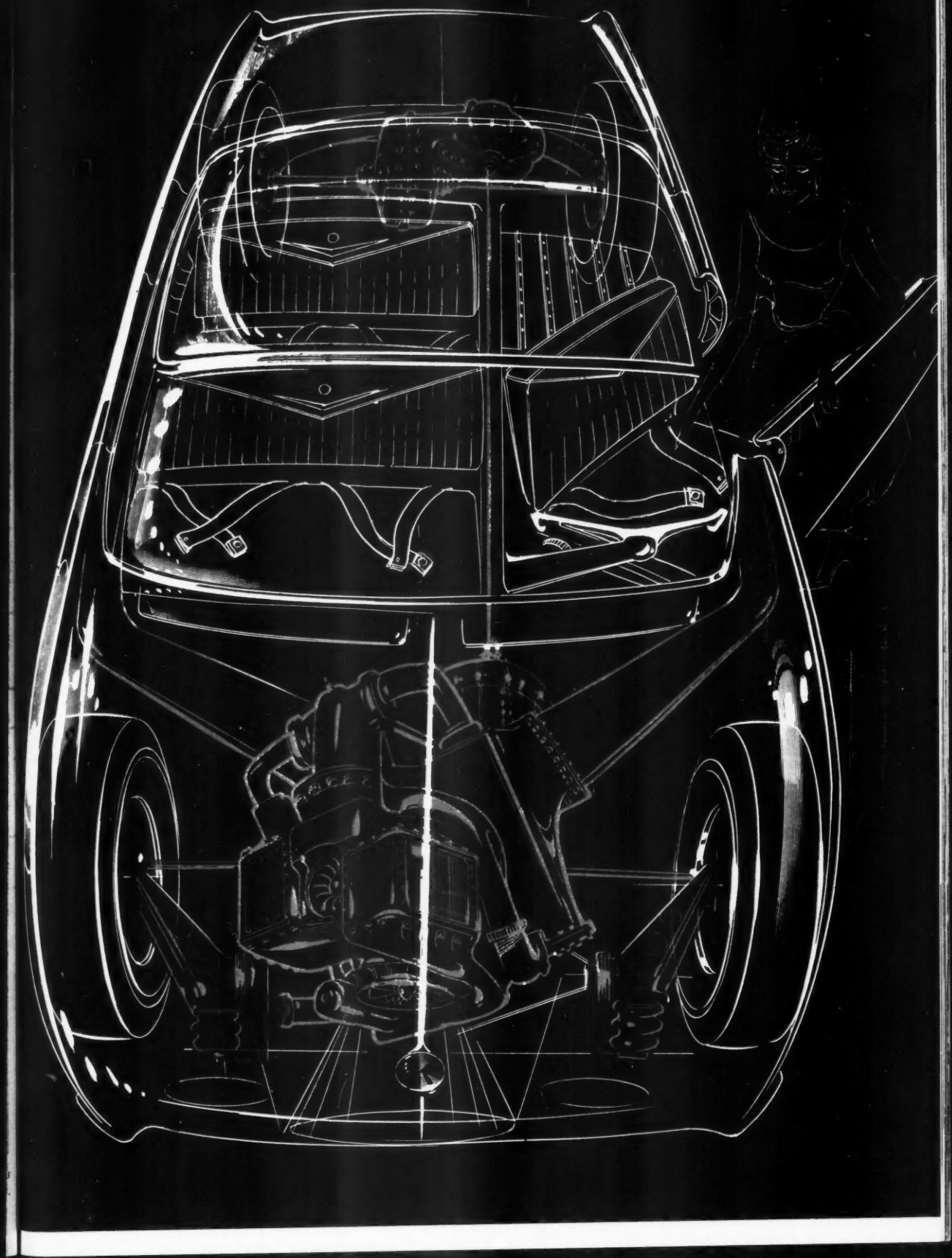
GM research engineers W. A. Turunen and J. S. Collman seem

*Illustrations by Charles Pelly*



*Turbine car of the near future will look and drive much like today's vehicles, but stylists can take advantage of lower hood lines, smaller engine compartments, and rear transmissions to gain passenger comfort and safety.* *For details see page 24.*





# Tomorrow's TURBINE Cars continued

to agree. GM has started tooling for production of a limited number of its GT-305 turbines (used in Firebird III) for commercial and military vehicles where their performance can be evaluated in service.

In other words, the present-day turbine, despite the solid advances that have been made over the past decade, still can be categorized pretty much as a technician's turbine. It has not reached that stage of perfection where it can be used to power today's high-production cars. Both GM and Chrysler agree that the best uses for the present would be in trucks (where some are now used), in buses and in military vehicles.

One problem that has been pretty well licked but still requires further refinement is heat regeneration. Present rotating regenerator designs are quite efficient in controlling internal temperatures and have resulted in greatly improved overall fuel consumption even at less than full-throttle operation. Turbines formerly were gluttons under cracked throttle. While the designs ot the Chrysler heat regenerator unit and that used in the GM GT-305, that have made increased fuel economy possible are quite different, the principle is the same. Rotating drums absorb the heat from the low pressure exhaust area of the turbine (separated from the high pressure chamber of the turbine by a bulkhead), and literally carry it back into the high pressure area.

Earlier this year a 1959 Plymouth powered by a turbine was driven from Chrysler's engineering laboratories in Detroit to Woodbridge, N. J. and back at an average of 19.39 miles per gallon while maintaining road speed of 38.3 mph. In a cross-country run two years earlier, the average was 13 to 14 mpg.

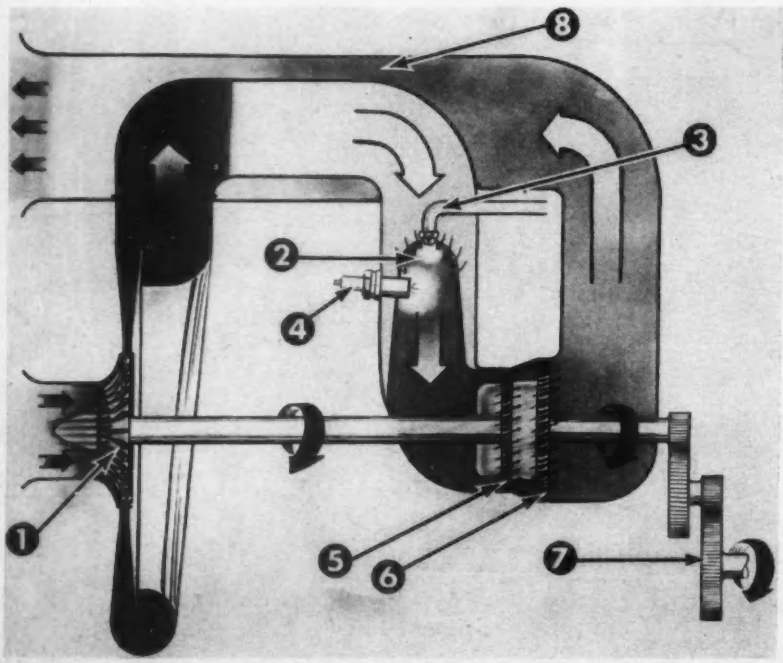
Throttle response has been greatly improved. In earlier automotive turbines it required six seconds to reach full torque when power was applied. This lag has been reduced at Chrysler to about one second.

Assuming that all the technical refinements are completed, there still remains the problem of developing a public demand to warrant production on a mass scale in order to bring costs within reason. Cost per turbine on a limited production basis would be so high that the average car buyer might not see sufficient advantage to justify the additional expense.

In larger trucks and buses the additional initial cost could possibly be balanced by lower operational costs. That is why engineers at Chrysler, Ford and GM are a little wary about making any guesses as to how soon turbines will come into their own. Produced in comparable volume, the turbine would cost no more than the piston engine.

Engineers, while very happy with the success of their experimental models, feel that more experience regarding the use of turbines in practical service is needed. This practical experience can be obtained over the next two or three years, but just how quickly a potential producer will decide that a "profitable and permanent market" exists is anybody's guess.

## CHRYSLER'S Gas Turbine

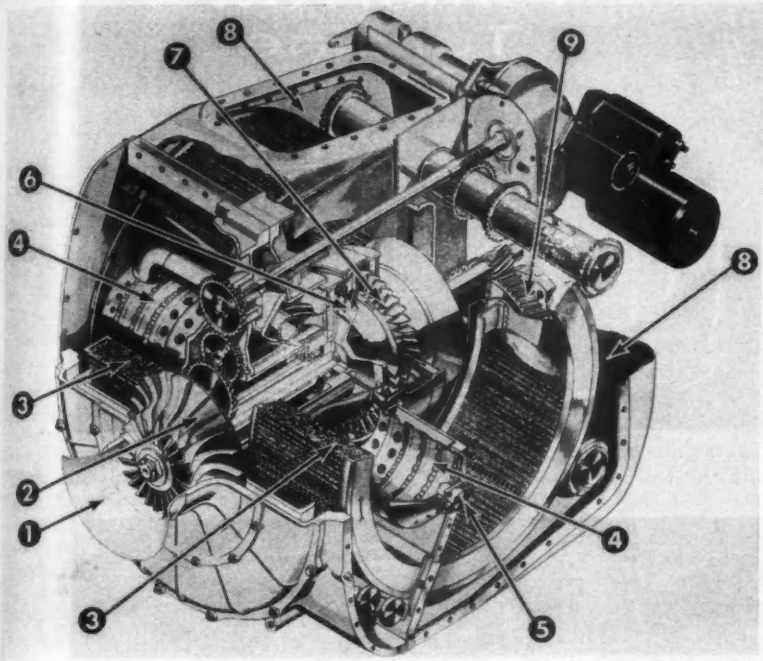



**THIS SCHEMATIC** of Chrysler's experimental gas turbine shows the relative simplicity as opposed to a piston engine. Operating temperatures are much higher.

Simply put, all gas turbines operate on this principle: An outside source of power (such as a starting motor or auxiliary engine) rotates the compressor shaft so that the compressor (1) can start sucking in air. This expanded, hot air is then directed to the combustion chamber (2) where fuel is sprayed in through an injection nozzle (3). (The spark plug (4) is used for starting purposes only; once the initial air "pocket" fires, an outside ignition source is no longer needed.)

The high temperature gases then pass through a first-stage turbine (5) which drives the compressor (eliminating further need of the outside source of power). The heated gases also pass through the second-stage turbine (6) which, through reduction gears (7), drives the car. The gases (cooled somewhat by this time) then pass through a regenerator (8), which has the main purpose of helping to heat the incoming air. The relatively cool air is then exhausted.

# GM'S Whirlfire




**THE GM GT-305 GAS TURBINE** in the Firebird III is a clean, compact unit measuring 32 ins. long by 24 ins. high. Weight is 600 lbs., and it generates 225 hp at 33,000 rpm.

It operates as follows: Air enters through the inlet (1), is compressed by the centrifugal compressor (2) and absorbs exhaust heat as it passes through two rotating regenerators (3). The compressed air then enters the combustors (4) where the fuel injection nozzles (5) spurt in the fuel. This creates a combustion, and the combustion gases pass through turbine vanes to drive the gasifier turbine (6). The gases leaving the gasifier turbine then drive the power turbine (7), which is not mechanically connected to the gasifier shaft.

The hot exhaust gases are then cooled as they pass through the rotating regenerators and the relatively cool exhaust gas (a mere 500°F) is then directed out through the exhaust ports (8). The power turbine is connected to the engine driveshaft through a single-stage helical reduction gear (9).

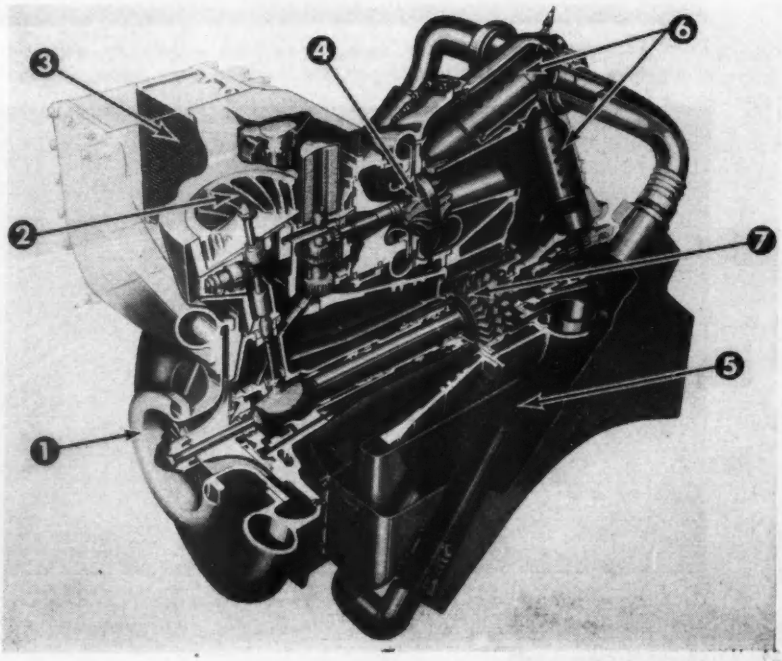
Besides being used to power the Firebird III, a GT-305 has been dropped into a weapons carrier for experience under varied conditions.

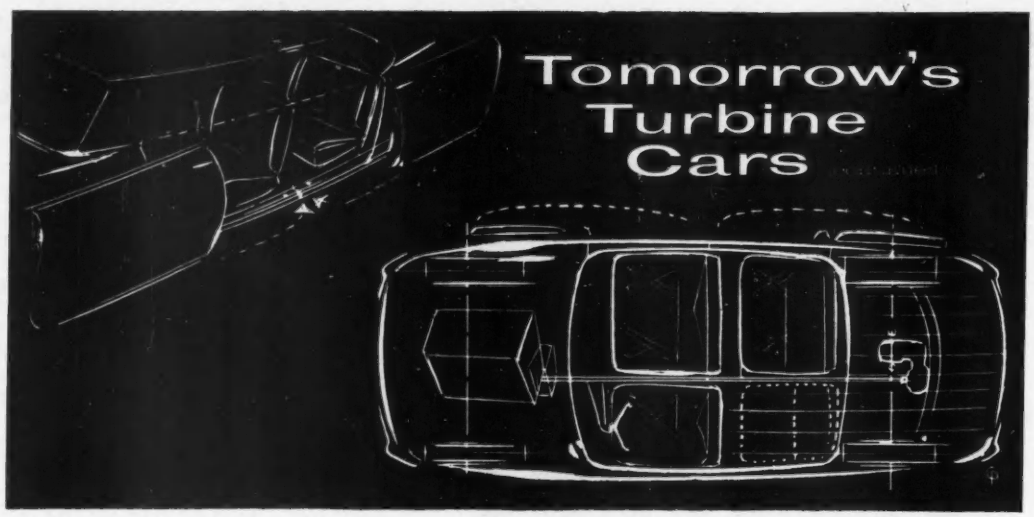
# FORD'S "704"

**FORD'S "704"** supercharged gas turbine "would fit into the engine compartment of a '59 Ford with room to spare." Complete with all accessories it measures 38 ins. long, 29 ins. wide and 28 ins. high. Power, 300 hp; weight, 650 lbs.

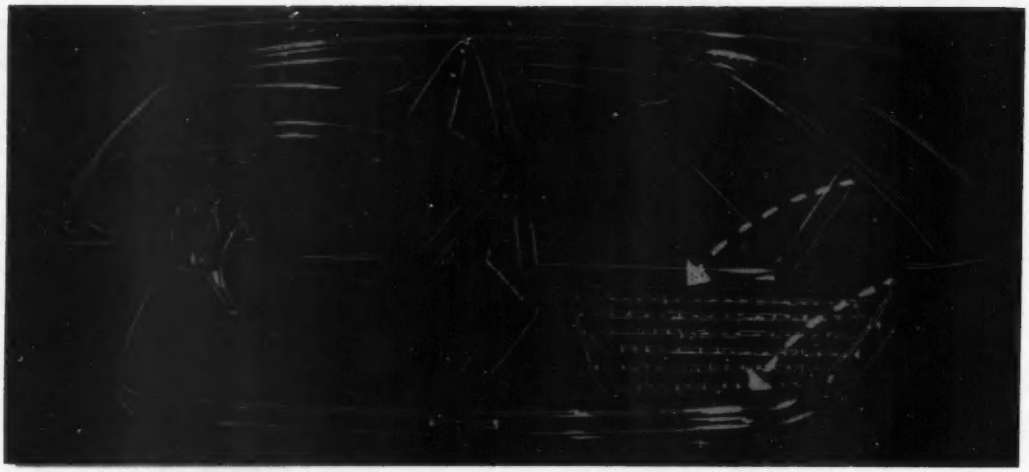
Ford engineers claim a distinct advantage for their turbine in that it uses two stages of air compression, "enabling the engine to deliver more horsepower from a smaller size."

The "704" operates this way: Air is drawn into the low speed compressor (1) where the air is heated to 450°F. Then it is sucked up by the intercooler fan (2), then through the intercooler (3) where the temperature is reduced to 220° F. Then it passes to the high speed compressor (4) where the air is raised to 625° F. It's heated again as it passes through the exhaust heat exchanger (5) and enters the main combustion chamber (upper 6) at 1000° F. Fuel is added, the mixture burns and exhaust gases drive the high-speed turbine. Additional fuel is added to the 1350° air as it enters the secondary combustion chamber (lower 6). The 1700° exhaust gases drive the power turbine and two-stage low compressor (7). The gases pass through the heat exchanger (5) and spill out to the atmosphere at 740° (roughly the heat of conventional engine exhaust).

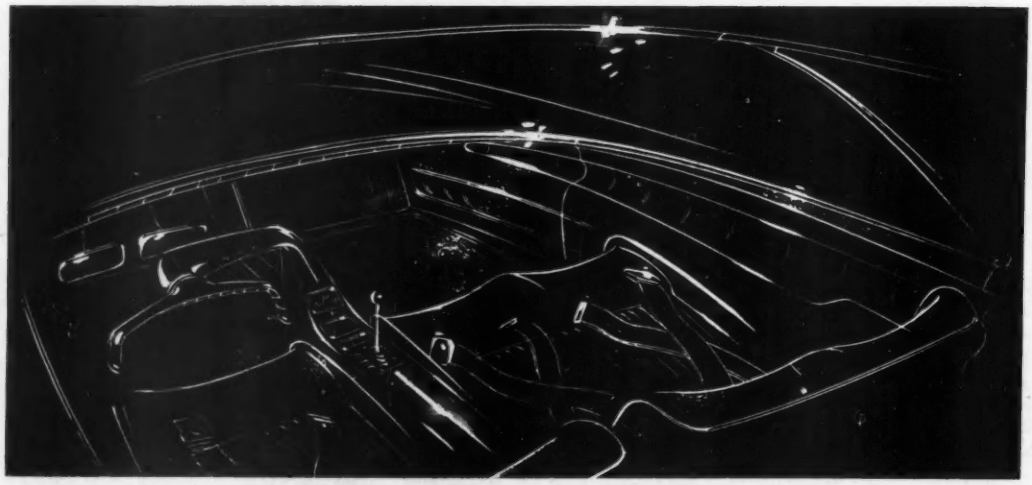





*Off-center member of three-rail frame houses driveshaft, provides extra rigidity that will allow the parallel hinged doors to line up and lock without any center post. The driver's seat is single bucket type.*



*Rear seat, duplicate of double bucket front seat, is separated from optional folding seat and baggage shelf by driveshaft tunnel. Shelf has access to rear trunk for carrying extra-long or bulky packages.*



*Cantilever steering column and driver's seat are adjustable. Abbreviated wheel is adequate for the variable rate power steering, and few instruments are necessary with the production turbine engine.*

# ...and what it feels like to drive a gas turbine car

*by Walt Woron*

**PROJECTING OURSELVES AHEAD** — anywhere from five to 15 years—and trying to conjecture what it will be like to drive gas turbine cars is no easy matter. The cars themselves might take any shape (such as General Motors' Firebird III, below), while the operational controls might be as complex as the panel on a jet airplane or (more likely) as simple or even simpler than the controls in Chrysler's gas turbine Plymouth (shown below). What can be done, though, is to report on rides and drives in present-day gas turbines. Then, knowing what can be expected from newer turbines, visualize what it will be like.

Take as an example my ride in a gas turbine Ford Thunderbird of '55 vintage. The car has a very early model turbine (not Ford's) which was developed before the advent of the regenerator (exhaust heat exchanger which also acts as a silencer). The exhaust comes boiling out of two six-inch holes in the sides of both front fenders—and you'd better keep clear of the blast. On a '59 or '60 T-Bird (that would take Ford's new 704 turbine with no body or suspension modifications) the noise level will be relatively low. Exhaust heat will be no more than you get out the tailpipe of any standard car. A certain amount of the high-pitched whine (not unlike a supercharger) will be there, but it won't sound like a Viscount or Boeing 707 winding up.

The T-Bird installation was made up mainly for transmission testing, because turbines will require that the automatics be beefed up. For this reason it has lots of instruments on the panel and even on the floor. In a future Ford truck or car with the 704 the only instruments that will be needed will be a speedometer and fuel gauge. Ford's turbine has a little "black box" that controls everything automatically; this includes overspeed (which would be anything over the fantastic rpm of 91,500 that the high speed compressor turns), oil pressure and temperature.

The acceleration with this "obsolete" turbine is quite impressive. With an engine rated at only 160 hp, the T-Bird will get up to 60 mph in 5.5 seconds! As Ivan Swatman (an engineer on the original design team) told me, "If we didn't care about the load put on the rear axle, we could use all the torque of the engine on take-off by revving the gasifier in gear, with the power turbine wheel locked. Then we'd cut in the power turbine and the car would fishtail down the straightaway."

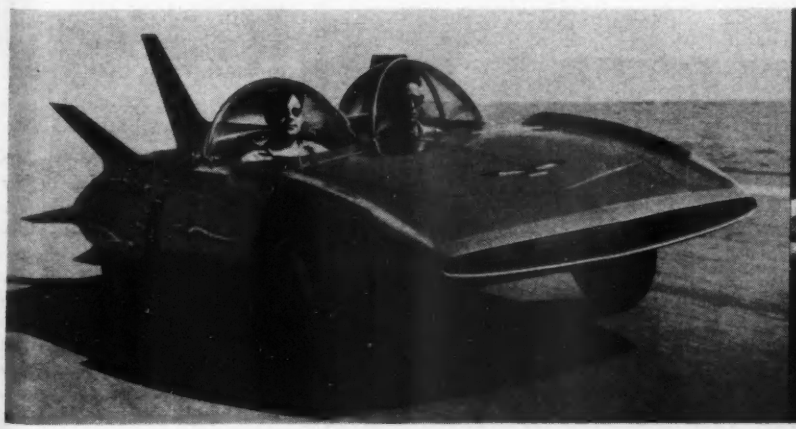
Moving from a standstill in DRIVE range, the T-Bird has enough punch to push you back in your seat. Rounding a corner under acceleration the rear end would just slightly break; a bit more throttle and a light sawing of the wheel would correct it. A floorboarded gas pedal and away it would scream.

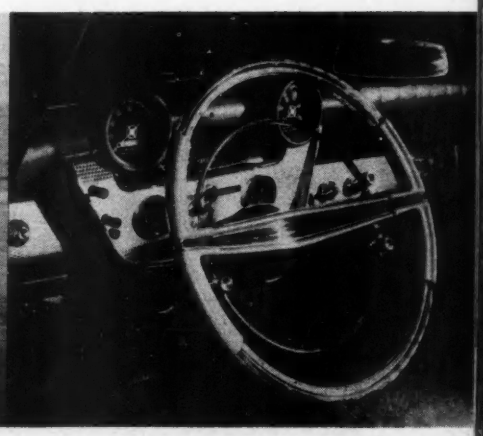
The turbine in the Ford truck was actually not designed as a complete engine. It consists of various components that were tested one by one and were then assembled into a prototype, tilt-cab truck for operational tests. Although the engine was an improvement over that in the T-Bird, it is still an obsolete engine according to present standards. It does, however, give some impression of what it will be like to drive a gas turbine vehicle.

You turn the key starter, holding it on for 14 seconds. (Ford engineers say they have the starting period cut to *four* seconds with their new turbine; this is equivalent to any piston engine.) During this time you hear a low whine, followed by a siren-like roar, then followed by a high-pitched whine which indicates that the power turbine is turning at 35,000 rpm and the combustion chamber is firing. (The truck, incidentally, uses unleaded gasoline as fuel; the T-Bird uses diesel fuel.) You let go of the key, move the Fordomatic lever to DRIVE and take off down the street. The noise you hear coming from the exhaust is still far above that from a turbine with a regenerator.

As far as the performance of this "assembled" engine is concerned, it even surprised the turbine research crew. One day they attached the truck to a trailer loaded with 65,000 pounds. Then they took it up a 30 per cent hill at the Ford Proving Ground—a feat *no other truck* has been able to perform there.

Turbine engineers figure that future turbine-powered cars will have less vibration transmitted to the body and to the driver. This will probably be one of the most noticeable differences between a piston-engine car and a turbine car. The reason is that a turbine does not have the pumping parts of the normal piston engine; the operation of any engine or motor with rotating parts is always smoother than one with reciprocating parts. Acceleration will also be smoother, while stopping will have to be improved because of the lack of engine compression; bigger and better brakes will probably result.

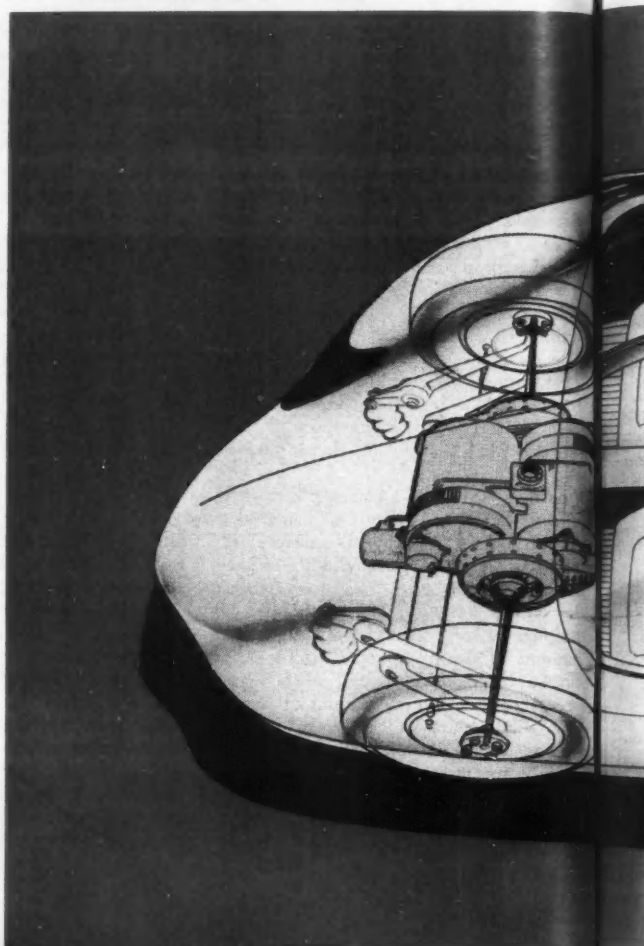




# Tomorrow's ELECTRIC Cars

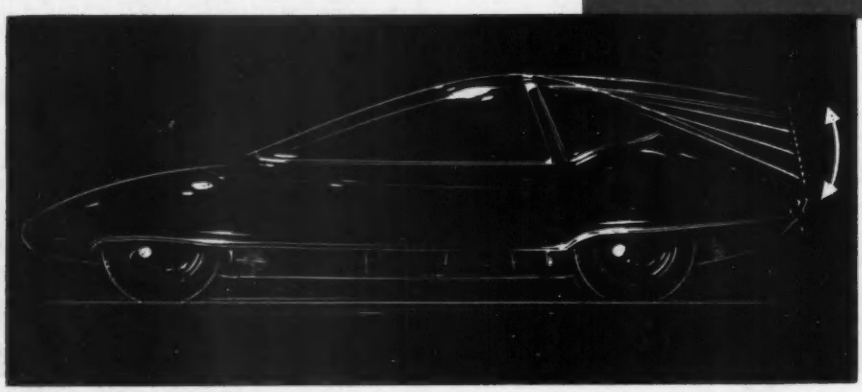
by W. A. Trayler, Jr.

**EDITOR'S NOTE—American Motors and the Sonotone Corp. have launched a joint long-range program to explore the possibilities of electric drive for automotive use. Rapid advances in the development of storage batteries of high capacity with relatively low weight, and the fantastic possibilities of the fuel cell battery now used extensively as a power source for electronic equipment in outer space vehicles, bring us closer and closer to a more desirable power source than burning fuel. The ultimate, of course, would be a small, safe, relatively cheap heat source such as an atomic pile, furnishing enough energy to operate a non-combustible expanding gas (steam or mercury) turbine, operating an electric generator to energize traction motors for drive. This would provide greater flexibility of control than direct drive from the fantastic gear reduction necessary to make use of the high-speed turbine directly as a motive source. Research of this type is long range but sure to become reality and far-sighted researchers want to be prepared by solving every possible problem of electric motor drive. The following is an outline of the research and development possibilities the joint AM-Sonotone project will pursue.**



**THE ELECTRICAL PRINCIPLES** of the series motor and its control are well known. What's good for diesel-electric locomotives, battery-powered industrial fork-lifts, the famous LeTourneau electric wheel and submarines is also good for electric cars.

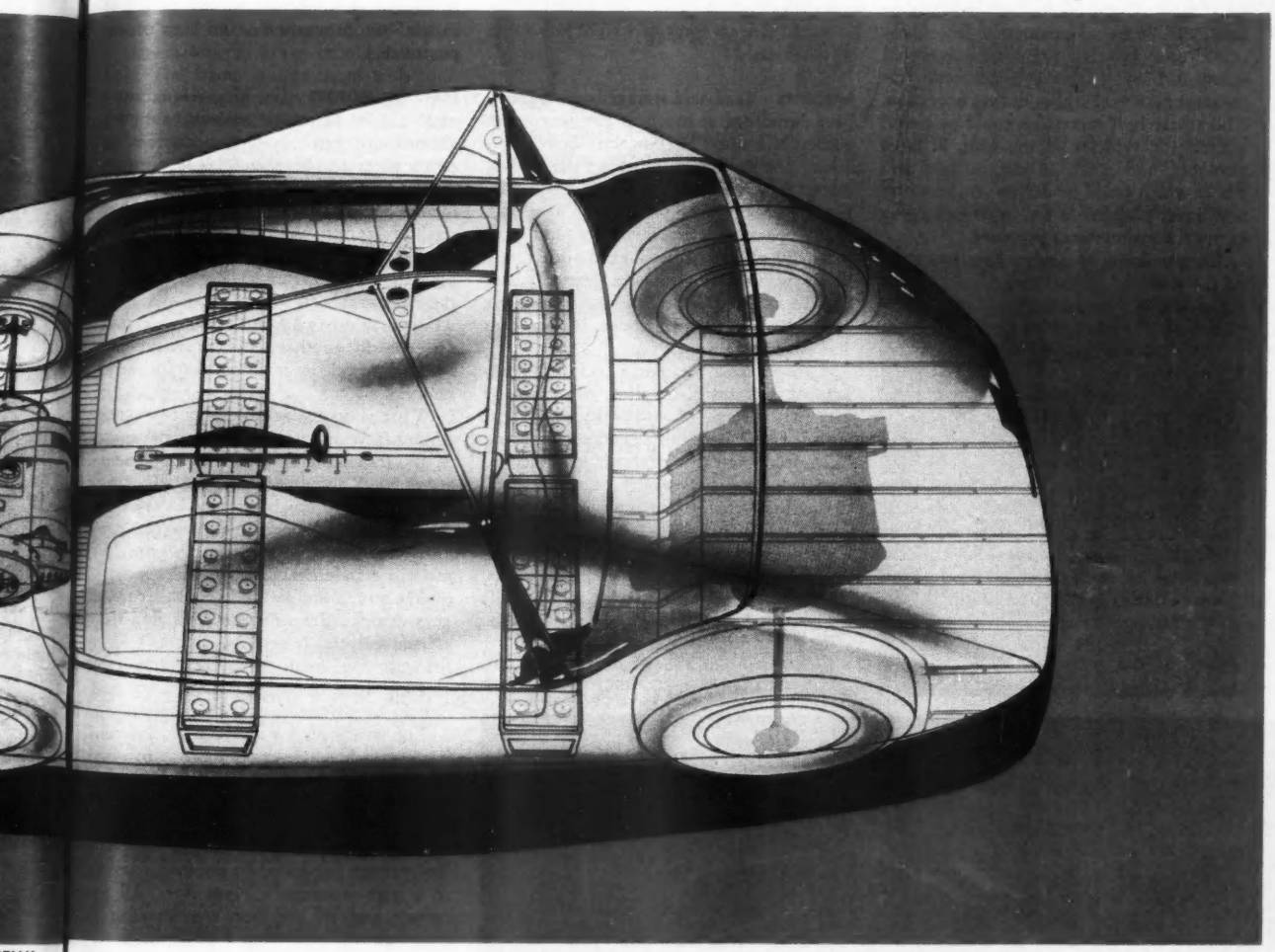
Now that the Charles Townabout sedan and Cleveland Vehicle's route-type delivery vans are entering production, battery-electric cars are coming to life, after an absence of some 28 years since the last assembly line.



ILLUSTRATIONS BY CHARLES PELLY

*Above: Small but powerful electric motors can be located at the drive point and require only a cable to connect them to the under-seat batteries. Simple controls and lack of shafts and linkage allow more usable interior space without bulky oversize exteriors. Left: Arrows show movement of rear deck, hinged at roof center, that converts 2-seater fastback into small but roomy van for heavy hauling.*

*Cars powered by batteries and electric motors are nothing new, but the developments are. That's why you can expect electric commuter cars on city streets — perhaps sooner than you think.*



A few of the old-timers, by the way, have outlived the generation of their origin and are still in daily service.

Improved roads, reliable engines, higher mileage tires, all reduced the woes of highway travel for fun or business, and short-circuited the electric car. It had to come home to roost by its battery charger.

Meanwhile, American automobiles generally have grown in size and performance and shrunk in height and economy. In numbers, they have doubled and redoubled, with a corresponding increase in air pollution from the wastes of combustion. Fuel, once relatively cheap, has increased in price while electricity, once a luxury, has become an economical source of power. True, the tax picture has contributed to the higher cost of gasoline to the consumer, but highway maintenance revenue must come from the user, and once this revenue decreases because of some other power source, a new method of vehicle use tax will be legislated. So only the pioneer users of electric cars are apt to avoid fuel taxes.

The really big news about electrics concerns the recent announcement by American Motors and Sonotone Corp.'s battery division, indicating a joint, long-range development project "to explore the possibilities of a revolutionary electric automobile, and to see if a more economical automobile might result."

In addition to applying the unique properties of the Sonotone battery, the joint

# Tomorrow's ELECTRIC Cars continued

program will include the development of a compact, high-performance engine (possible forerunner of an atomic-powered steam turbine), driving a generator for constant battery charging during operation. This research, if successful, could very well put electric vehicles on the road, in large numbers, and result in electric cars and trucks which could be driven cross-country and never plugged in for battery charging except for maintenance purposes.

To get down to basics, here are some of the electrical principles and design features that will be researched for the AM-Sonotone type of electric auto:

Batteries — lead-acid and nickel-cadmium.

Traction motors—direct-current series motor, with field-shunting.

Mechanical drive-train—gearing traction motors to wheels.

Accessory components—brakes, lights, power assists, heaters, battery chargers, radios.

Auxiliary power sources—constant battery charging, average power required, engine cranking, lighting and heating.

General vehicle design—freedom to locate components for best weight and space distribution.

**BATTERIES** Lead-acid storage batteries have been improved as much as any part of an automobile since 1910 when "Boss" Kettering first used them to power the electric starter for Cadillac. A great variety of glass fibers, rubbers and plastics are used for jars, separators, retainer mats and acid seals. By alloying selenium, or other rare earth metals, with lead, the battery plates can be made thinner without sacrificing strength or life, with about 30 per cent less weight.

Conventional lead-acid cells, regardless of size or plate alloy, each have a nominal voltage of two volts; they float on charge, when fully charged, at about 2.25 volts; and the sulphuric acid electrolyte has a specific gravity of about 1250 when fully charged in motive power cell sizes.

The Sonotone sintered-plate, nickel-cadmium storage battery has been developed since World War II. It costs substantially more to produce than conventional lead-acid batteries, but is much smaller and lighter for comparable energy output. The battery can withstand great overload or surges of current, can be recharged rapidly at a high rate, has a very long life, retains most of its charge even if stored for a year, and will not freeze at −60° F.

Sonotone cells have a nominal voltage of 1.2 volts, float on charge at about 1.3 volts, and use 30 per cent potassium-hydroxide electrolyte. A tiny cell 6 ins. high, 2 ins. wide and ½-in. thick will discharge up to 50 amperes for a short time. It was not designed for motive power, of course, but demonstrates the high-current potentials.

**TRACTION MOTORS** The king-size creations of Mr. LeTourneau use generator-supplied, alternating-current induction motors for power steering, bulldozer blade positioning, load-hoisting, and other tough assignments on his timber clearing machines, trackless trains, and mammoth construction machines. These machines have a separate direct-current generator to power the electric wheels which move the giants while they are working or moving from one job to another. The heart of each electric wheel is a direct-current series motor.

What is so remarkable about this type of motor, which is called a *traction motor* by the transportation and electrical industries? Every automobile has one: the lowly electric starter, which assumes its true importance only when it doesn't work!

In common with the electric starter, all modern traction motors are series wound, which means simply that *all* the current goes through the armature coils, and then *all* the current (the *same* current), goes through the field coils. Therefore, the rotating armature and the stationary field circuits are connected in series relation.

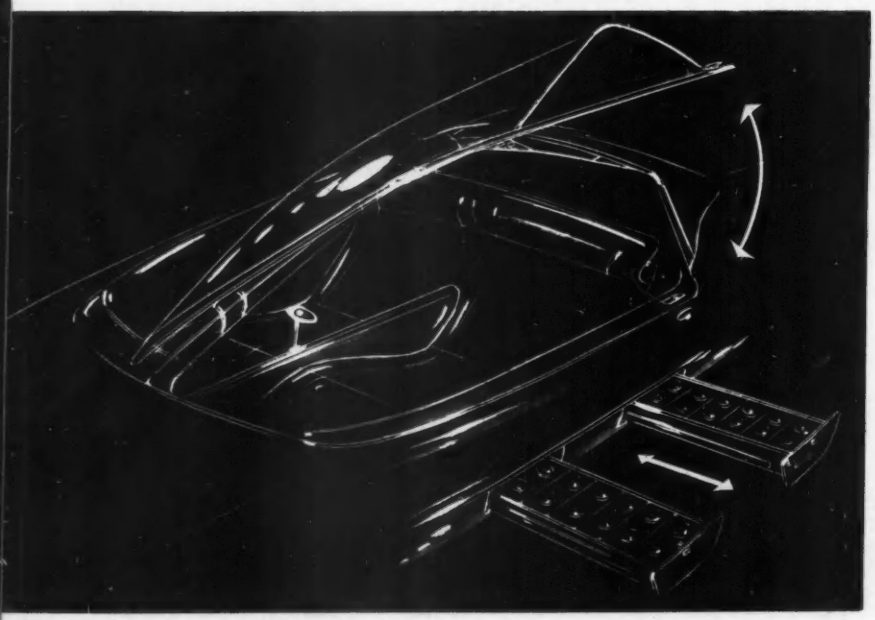
The wire sizes for all the coils and connectors inside a traction motor are quite large. This means that the total electrical resistance for the motor is very low, measured in hundredths or thousandths of an ohm. When the armature is at rest, a low voltage impressed on the motor results in a high-amperage current flow. All the copper and all the iron are working to their utmost, producing a powerful interacting magnetic field and a very high torque. The motor revs up, but it has no power.

What to do? Well, the voltage impressed on the motor must be increased, or something must be done to weaken the magnetic field. During the era of the tiller-steered battery buggies, the impressed voltage was raised by notching out a rheostat until the full battery voltage was put across the traction motor.

The only way to weaken the field of a traction motor is to by-pass the field at the proper time by a high-capacity resistor, called a shunt, which robs the field of a

continued on page 69

*Center-hinged transparent top will provide ease of entrance and exit despite low overall height. Stainless-steel trays housing battery supply slide out for service.*



# ...and what it feels like to drive an electric car

*by Len Griffing*

**YOU ARE GOING** to be surprised the first time you drive an electric car because there is absolutely nothing unusual about it. It's just like driving a conventional automobile—perhaps less complicated.

The Charles Townabout looks quite a bit like a customized Karmann-Ghia, except that the rear fenders have the suggestion of a fin and the entire body shell is glass-reinforced resin moulded in one piece. The frame is aluminum with four-wheel independent suspension—again à la VW, but actually fabricated in one hour by two men on jigs at the Stinson Aircraft Co. plant in San Diego, Calif.

The car is sold for $2895, which includes charger and a built-in cord and reel for plugging into any 110-volt outlet. And they are being sold—three-quarters of a million dollars' worth of orders have been accepted as of this writing. This represents all the Charles production until the first of next year.

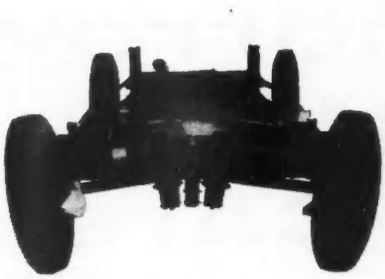
Chatting with Hugh Waldman of Charles Motor Corp., we discovered some of the teething problems the production people had. Initially, the specifications on their batteries unit called for a 300-ampere-hour rating and weight not to exceed 450 lbs.; no supplier could comply. They were forced to use an industrial battery case of 160-ampere-hour rating weighing 632 pounds. However, with a 3000-unit order to their specs available and waiting, several manufacturers suddenly found that not only could their specs be met, but possibly even beaten a little. The new batteries will be arriving by the time you read this and will increase the range by some 40 per cent.

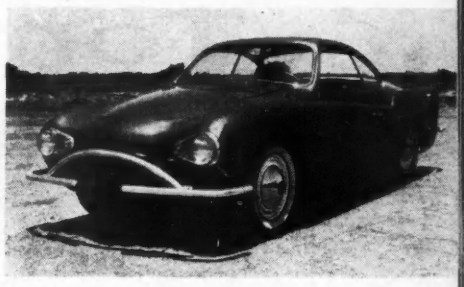
The pilot model that MOTOR TREND tested has approximately an 80-mile range. Doesn't sound like much . . . ? How many miles does your wife drive in a day? Chances are, if she's like some 80 per cent of second-car drivers, she travels *under 100 miles a week.*

Actual motoring, as we said, is a surprise because everything is quiet. Electric motors make no noise, and there is absolutely no vibration. The nearest sensation is that of coasting with a conventional engine switched off. The one exception on our test car was gear noise. Experimental gearing was improvised; production models will be quiet.

Acceleration is as good as or slightly better than that of a VW. Torque is good—the Charles gets off the line with a snap, and acceleration is nearly linear up to a top speed of about 50 mph. It pulls hills at least as well as a VW.

Power source is four 12-volt batteries in series, totaling 48 volts. These are concealed under the luggage shelf behind the seats and supply power to two direct-current motors, located one each atop the rear half shafts. They are positioned close to center so as much weight as possible will be sprung. They drive the axles through 6 to 1 covered reduction gears that strongly resemble inboard-mounted drum brakes (no transmission or differential is required). The braking system is four-wheel hydraulic.





*Charles Townabout electric car is full sized, with two trunks and large interior storage area. Acceleration is equal to VW, top speed 50 mph, range 80 miles plus. Energy from the batteries is supplied to two 3.2-horsepower electric motors, located on top of the rear axle half-shafts, and drives them through reduction gears.*

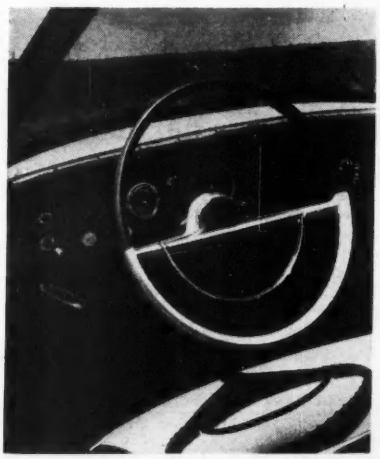
The two motors are rated at 3.2 hp each, but electrical horsepower is a deceiving thing. Brake horsepower (bhp)—the rating factor with which we are most familiar—totals 35.

This combination gives fairly good performance and very good handling characteristics. Once underway, releasing the "accelerator" (actually a rheostat pedal) gives the effect of free wheeling. When the motors do not drive, they offer very little rolling resistance. Tire and gear friction are the only factors, other than brakes, that slow the car.

Steering is quick, and the all-torsion-bar suspension system holds the car flat when you cut the wheel. Cornering is fast and free of tire squeal.

Hugh Waldman explained to us that the Townabout is not designed to replace the gasoline automobile, but rather to supplement it on a second-car basis. The conditions that led to the demise of the electric car years ago—cheap gasoline, and high-cost electricity not readily available—have actually been reversed. Today gasoline is probably the most expensive fuel you can buy, and electricity the cheapest. There's hardly a home, motel or garage in the country today that doesn't have a baseplug, and a completely discharged set of Townabout batteries can be fully recharged overnight.

Three questions that concerned MOTOR TREND were: Where can you buy a Townabout? Where do you get it serviced? What about its future? In these respects, the Charles Motor Corp., is approaching the problem logically.



*It's easier to drive the Charles than a conventional car: no clutch, no gears to shift. Operation is smooth and quiet.*

Already established dealers in Detroit-type products are accepting franchises all over the country. These men will sell and service the car. There is very little, short of bearings, that will need replacement.

As for the future . . . if you will think for a moment—those satellites revolving around the earth that blip-blip for weeks send their blips courtesy of ultra-lightweight batteries. They're still sort of semi-classified, but that really doesn't matter—at this time one of those batteries costs as much as the whole Charles Townabout. But when these featherweights are mass-produced, watch those costs come down. In the meantime, lots of credit and lots of luck to these modern-day electric car pioneers.

# Tomorrow's AIR Cars

*Bridging the gap between car and airplane—yet neither a flying car nor roadable airplane—the Curtiss-Wright Air-Car uses air for propulsion, air for suspension and travels over land or sea.*

*by Steve DaCosta*



*Chrysler's twin-rotor, ducted-fan aerial jeep is designed to fly at a speed of 25 mph, among trees and around buildings.*

**AS EARLY AS 1955** the Chrysler Corp. felt there was a need for a military vehicle that would have a third dimension in mobility—flight. They began experimenting with ducted fans as a means of providing both lift and propulsion for a low-speed, low-altitude flying vehicle. Then on July 15, 1957 the Transportation Research and Engineering Command of the U.S. Army granted a research contract to the corporation and serious studies of the possibilities got underway.

The first of this year Chrysler announced that it had a working model of a flying jeep that was roughly 23 feet long and 10 feet wide, with a 250-hp engine that operated two 8.5-foot fans, propelling the vehicle along at about 25 mph. Its purpose was to fly slowly near the ground, among trees and buildings, and to hover in close proximity to ground personnel. Wind tunnel and other operational tests are now being conducted with this model and other designs in which as many as four fans are used.

Later in the year Curtiss-Wright announced—in a world-wide advertisement—that it had developed "a vehicle that rides on a cushion of low-pressure air and does not use conventional wheels, axles, brakes, clutches, transmissions, differentials or frame. . . . Curtiss-Wright believes that the Air-Car is capable of wide application and many uses. Because of its simplicity, the price and operating cost will be low. In production, it would be competitive with automobile prices. Anyone who can drive an automobile can quickly learn to operate the Air-Car."

With a come-on such as this you can understand why the response has been overwhelming. Interest in this "new method of suspension and propulsion" is exceedingly high; there's little wonder, for it's a fascinating new concept of transportation.

Minard W. Stout, VP of Research and Development at Curtiss-Wright, points out that ". . . the Air-Car does not fly in the

sense that an airplane or helicopter does. You cannot use it for hopping over objects or fences or hedges. Instead, it floats over land or water on a cushion of low pressure air and it is inherently stable on this cushion. In other words, you do not have to fly the Air-Car—you drive it as you drive an automobile."

Propulsion of the Air-Car is accomplished by releasing air through louvers located in several areas on the outside of the vehicle. The air released is of low pressure (about 0.1 lb. per square inch) and of low velocity. It is capable of propelling the vehicle in any direction and of turning the vehicle on its own axis. In addition, the propulsion air is used for braking.

Though we were able to take a ride in the C-W Air-Car, it was pointed out to us that already this "car" is an obsolete model. In the offing is an advanced Dual-Fan Air-Car in which noise, propulsion and other problems have been cleanly worked out. This machine has reached the preliminary specifications stage in design by the Wright Aeronautical Div. and is scheduled to be built by the firm's South Bend, Ind. division. These are its specifications:

**DIMENSIONS** It is 21 ft. long by eight ft. wide, with an overall height of 50 ins. to the top of the driver's compartment. Height to the top of the front and aft deck is approximately 36 ins. Estimated vehicle weight with four passengers and a full gas load is 2800 lbs.

**POWER** The vehicle powerplant consists of two standard engines, classified as to type, but totalling 300 hp. These are mounted in a horizontally-opposed position aft of the passenger compartment and use conventional gasoline fuel. The engines drive two multi-bladed fans through suitable reduction gearing and incorporate an interconnect shaft so that one engine can drive both fans should the other be shut down.

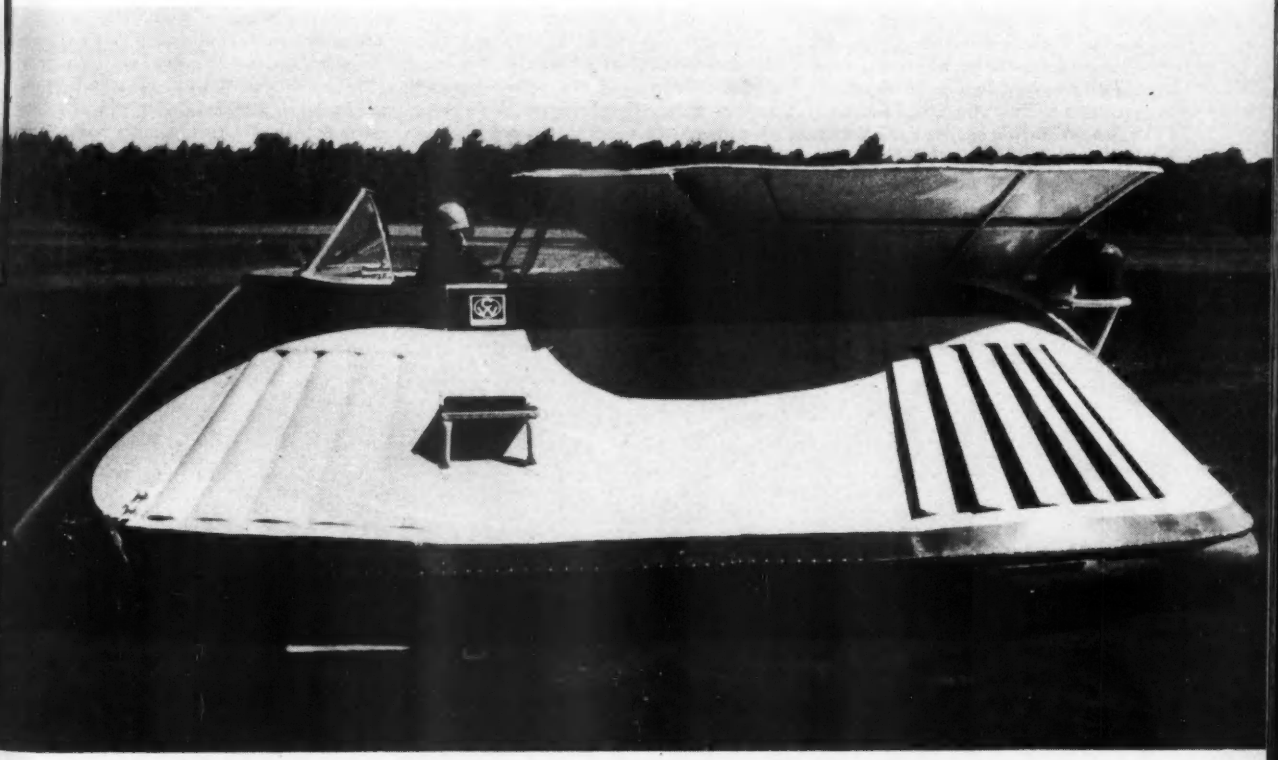
**CONTROLS** Directional control (forward, reverse and turns) is achieved by a column-and-wheel arrangement similar to that of a standard light airplane where forward motion of the column produces forward motion of the vehicle, aft motion of the column produces braking or reverse, and turning the wheel in the appropriate direction produces turning in that direction.

**SPEED** The estimated maximum speed of the Air-Car is approximately 50 mph, subject to engine choice and size. Additionally, while the machine's major intended use is for flat terrain it will be capable of climbing grades of six to eight per cent.

The suspension, or lift, of the vehicle is accomplished through maintaining approximately 0.1-lb. pressure per square inch under the car augmented by a deflection membrane, the design of which allows any number of exterior shapes as desired. Maximum height can be modified to meet special requirements.

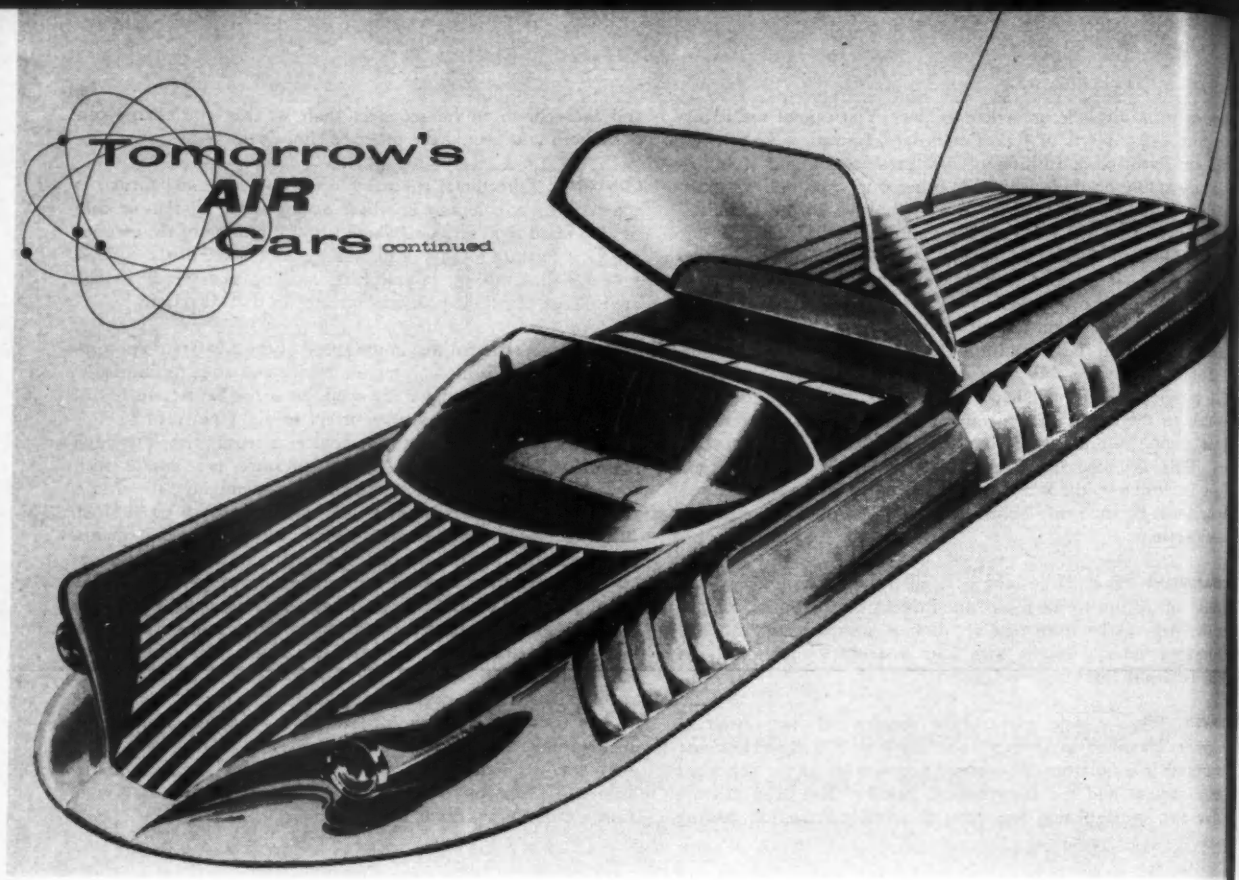
Possibilities as to types of configurations and amounts of payload are shown in the accompanying drawings and in these examples: A machine having the ground area about equal to a Volkswagen would be capable of supporting a 200-lb. load with a 65-bhp engine; a vehicle of the area range of a 1959 Detroit car would weigh about 1500 lbs. and would be capable of supporting 700 lbs. payload with a 300-hp engine.

Interested in buying an Air-Car? You can, provided you "...can be helpful in establishing configurations and performance which will result in maximum utilization of this highly versatile vehicle." Those interested should write to the Curtiss-Wright Corp., 304 Valley Blvd., Wood-Ridge, N.J.

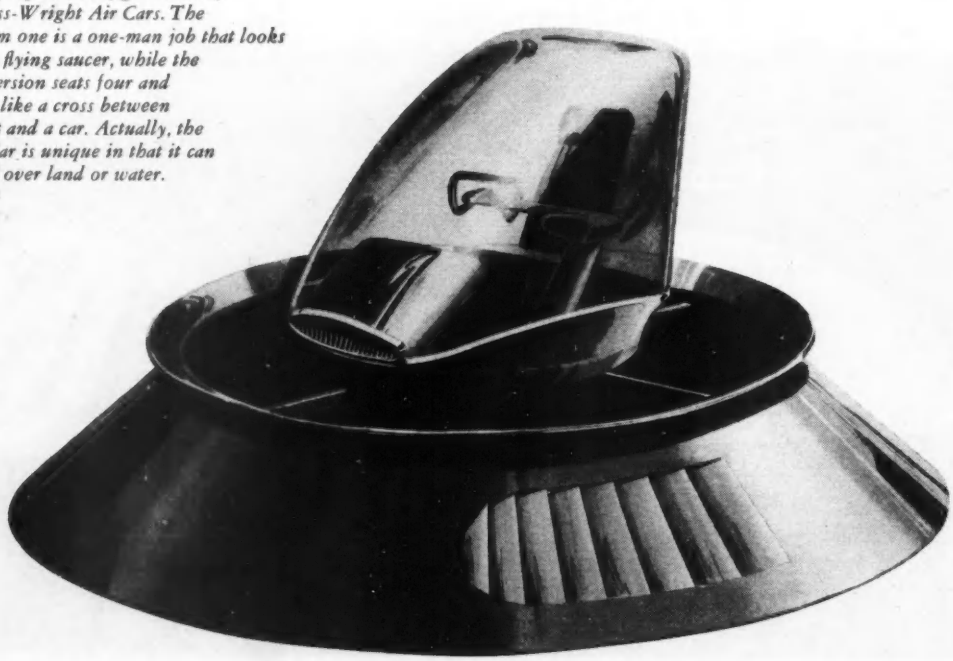


*Curtiss-Wright Air-Car in a test "flight" demonstration shows the feasibility of this new form of travel.*

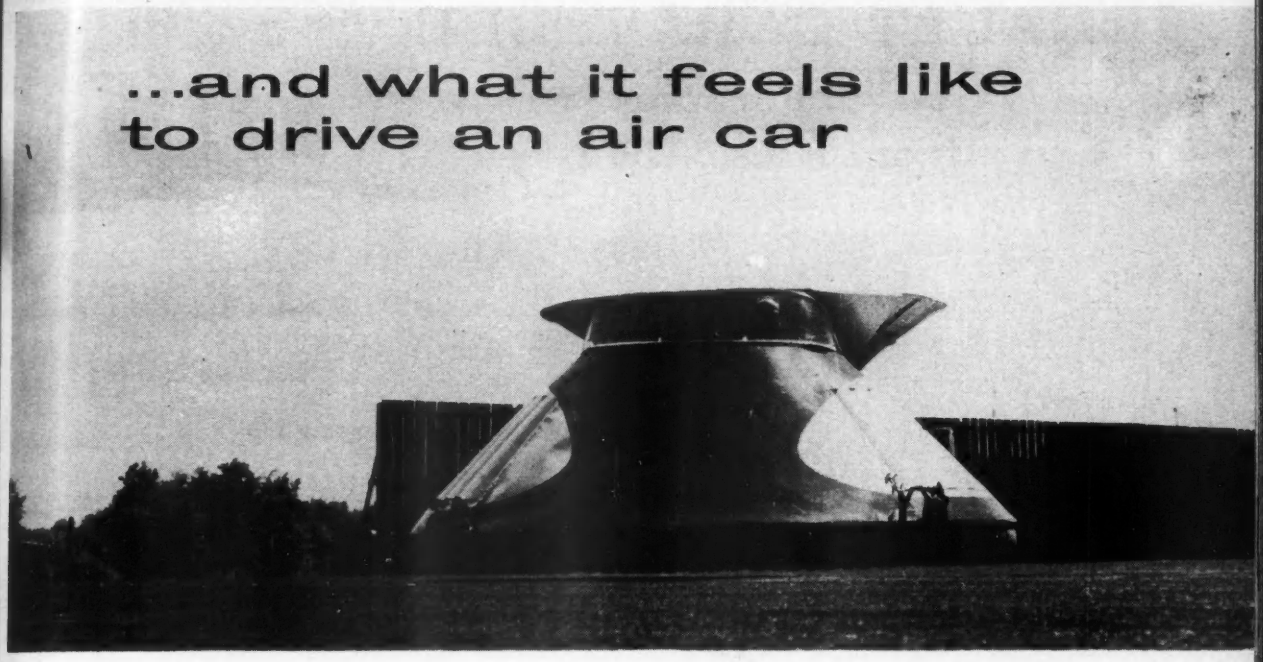
# Tomorrow's AIR Cars continued



*Two proposed configurations of Curtiss-Wright Air Cars. The bottom one is a one-man job that looks like a flying saucer, while the top version seats four and looks like a cross between a boat and a car. Actually, the Air-Car is unique in that it can travel over land or water.*



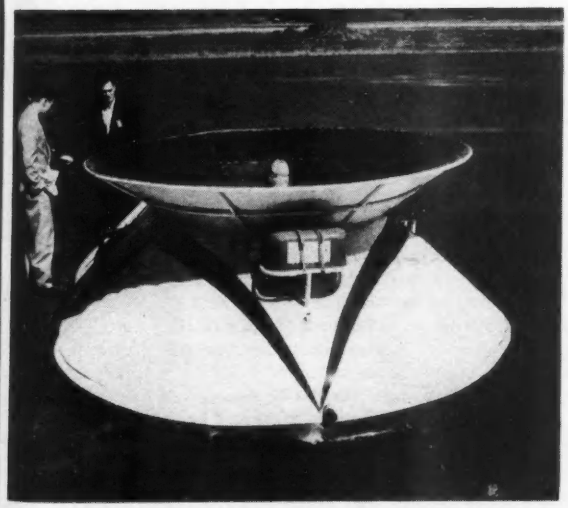
# ...and what it feels like to drive an air car



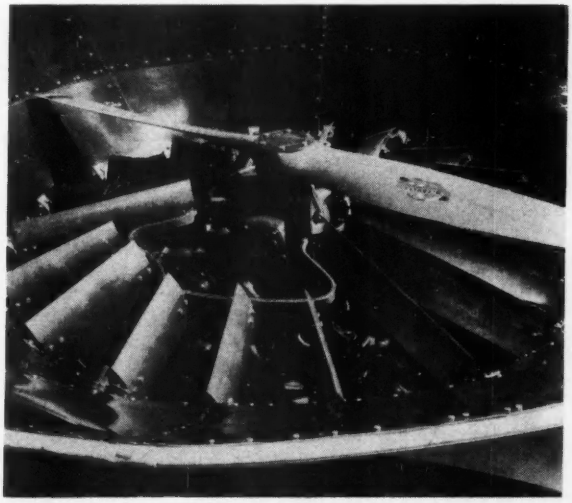
**THE SENSATIONS** received from riding on a cushion of air 12 inches thick while seated bolt upright in a narrow and quite functional "cockpit" located at one end of a rectangular shaped "flying machine" prototype gave me a feeling of uneasiness. The Curtiss-Wright Air-Car, proposed forerunner of a type of transport intended primarily for agricultural, off-the-road use, moves first up from the ground to its predetermined altitude, then through controls similar to aircraft type propels forward, reverse, and in any direction. As a willing passenger—but a reluctant pilot-operator —I "rode" with former experimental test pilot Vernon Crane, one of several Curtiss-Wright personnel qualified to "fly" it.

In its present stage the Air-Car is strictly functional. Controls as such are basic, but what has been proved is that vehicular movement by the compressed air theory is a reality. Plans and drawings are well ahead of the actual working model which, while in flight, is closely observed by the crew whose project it is.

To sum up riding impressions, it is rather like being in one of those electrically-operated "bang-'em-up" cars that are a feature of carnivals and beach amusement zones. The noise is deafening as the present 65-hp aircraft engine is separated from the cockpit by only the sheerest of aluminum paneling and wood struts.



*Propulsion of the C-W Air-Car is accomplished by means of a 65-hp, 4-cyl. aircooled engine which drives a propeller that sucks air in through the top saucerlike opening. Air is then deflected under low pressure and low velocity out the bottom and through side louvers. The vehicle can be propelled in any direction and is able to turn on its own axis, just like a top.*



# RENAULT CARAVELLE

## editor's report from FRANCE



**LAST OCTOBER** at the Paris Salon d'Automobile the Renault factory introduced a prototype of a coupe on the Renault Dauphine chassis. Along with announcing that the Floridé would be brought out during the 1959 model year, they also stated that the rate of production would be determined "according to the orders in France and abroad." The approximate price, they stated, would be 850,000 francs (about $2024 at the rate of exchange at that time).

The reaction was overwhelming. Production has been set and come late fall you can take delivery of your coupe or convertible in white, red, beige, light or dark blue. You'll have to put your name on a waiting list and shell out close to $2600, but the Caravelle (as it will be known in the States) is well worth it.

Of course, you *should* like small cars, otherwise stay away from it. You should also either be single or have convinced your wife that the occasional jump seat is adequate for mother-in-law, the small kids, or the dog. On the other hand, if you're well-heeled, the Caravelle would make an excellent second car.

Late this spring I had the opportunity to try out several prototypes of the Caravelle in Brittany, France. These cars were hand-assembled by Ghia, were heavier than the production versions and were each a bit different from the other. The car is basically Dauphine, with the big difference being in the coachwork. Starting with the basic four-wheel independent suspension, Renault drops on a coupe or convertible body that's about 14 feet long and stands slightly over four feet in height. When fitted with its very comfortable bucket-shaped seats, it can accommodate two average-sized adults and two small children on a bench seat in the rear.

The Caravelle is a comfortable car. The seating position is good; you can push yourself away from the pedals (well-spaced) and not be too far from the steering wheel. You sit in a lower and more stretched-out position than in a stock Dauphine. The gearshift lever, on the floor, was too far forward in these cars but is supposed to be moved back a few inches, which will prevent the too-far reach to the forward gears of the gate. (The passenger's seat is also adjustable fore and aft, while both seats can be made to recline.)

There's an unusual amount of storage space throughout. The front compartment, felt-lined, houses a battery, but gives 8.4 cu. ft. of room for a three-suiter suitcase and a few smaller bags. There's also baggage room (6.8 cu. ft. of it) on the shelf created by folding forward the rear seat backrest. Behind that there's a small (1.9 cu. ft.) storage compartment reached through a center trapdoor. This space is provided in the coupe only; in the convertible it's taken up by a soft top. Then there's an average-sized glove compartment, and four pockets.

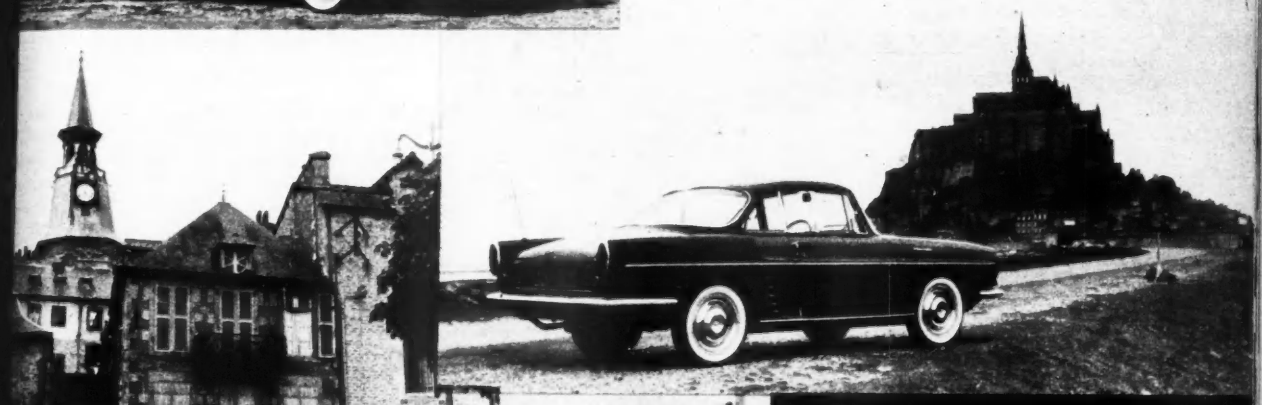
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# Renault's new sports coupe spells trouble for Volkswagen's Karmann-Ghia.

*Story and photos by Walt Woron*



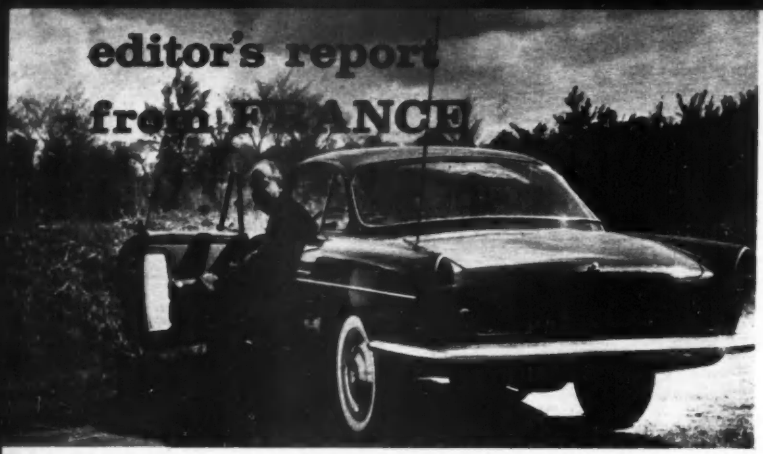




*The Brittany coast of France, and particularly Mont St. Michel, serves as beautiful backdrop to the new Renault Caravelle. In fall of this year the car will be seen in action as below on roads of this country.*







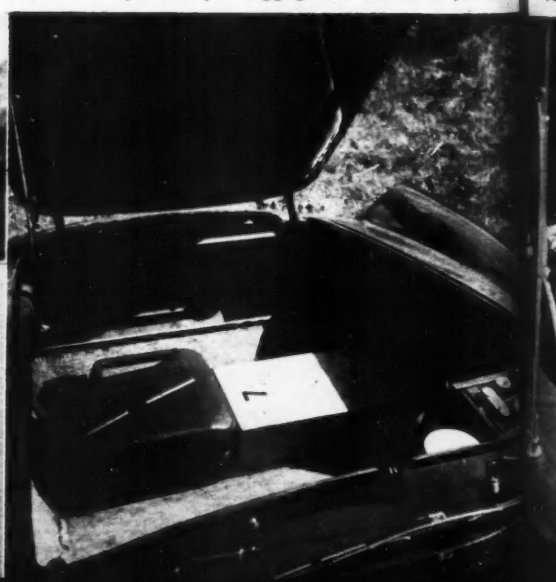

*The seatback of the rear seat (below) folds forward to form an additional baggage or grocery-carrying area. Behind that there is another trap door where things of value could be hidden.*



*Steering wheel and controls are well positioned, though the roller-type throttle pedal is not too comfortable. Transistor portable radio can be seen under dash beneath glove compartment.*



*Front luggage compartment of prototype is not quite as plush as production models, being covered throughout, but is spacious for luggage on weekend jaunts.*



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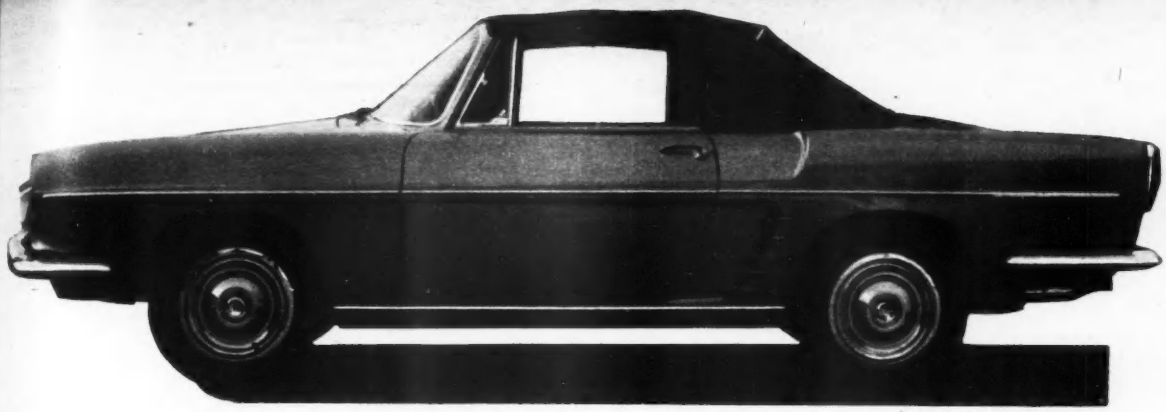
The two basic models differ only slightly in appearance when the hardtop is fitted to the convertible. This, incidentally, snaps into place right over the convertible top in its stowed position, à la Corvette, and is priced as an extra. As far as any difference in rattle frequency of the two types of cars, I couldn't detect any for, quite frankly, they had been driven mercilessly by other press members to the point where anything would rattle.

Vision out of both cars, with the hardtop in place, is exceptionally good. You can easily see all four corners of the car. After you get someone to help you lift off the hardtop, then raise the soft top into place, you'll have blind spots left and right rear.

A few minor points of objection to the car's interior are to be corrected on production models, such as the knuckle-scraping location of the door handle, the too-low geared window crank and the doors that don't open wide enough. Even after this latter is corrected, my feeling is that it won't be suitable for all people. Personally, I'd prefer the door to hinge at the rear, swinging open at the front.

The dash panel setup is similar to the Dauphine, with all instruments grouped together and consisting of speedometer, odometer, water temp, gas gauge and warning lights for battery discharge and low oil pressure. Here again, a personal preference would be for a tachometer, mainly as a matter of curiosity. In place of the normal radio you can have a portable transistor that fits under the panel on the passenger's side and is somewhat larger than the Oldsmobile Sportable.

Though the engine is basically Dauphine (51.5 cu. in., overhead valve in-line, four-cylinder with wet sleeves) it has been hopped up by increasing the compression ratio to 8:1 (from 7.25:1), grinding a higher



*The Caravelle will come in two basic body models: convertible (seen here) and as a coupe. With the convertible you can order a detachable hardtop at extra cost.*

lift on the overhead camshaft and by opening up the carburetor throat and the intake ports. This has upped it to 40 bhp @ 5200 rpm from 30 bhp @ 4250 rpm in the stock Dauphine. This gives it enough power to overcome the added weight (1675 lbs. for the coupe, 1645 for the convertible and 1720 for the convertible with hardtop) over the Dauphine so that it out-performs the stock four-door sedan.

With a 4.375 rear axle, here are the maximum speeds in each gear for both the three-speed and four-speed boxes:

**Three-Speed**

| RPM | 1 | 2 | 3 |
|---|---|---|---|
| 5200* | 22.4 | 48.4 | 79.6 |
| 6000 | 25.8 | 55.8 | 91.8 |

**Four-Speed**

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 5200* | 22.4 | 38.5 | 54.6 | 79.6 |
| 6000 | 25.8 | 44.4 | 63.0 | 91.8 |

*Recommended rev limit

In driving both the three-speed and four-speed cars I felt that the three-speed was a bit more positive in its gear changing. The gears could actually be found easier, whereas the four-speed bordered on sloppiness. Three out of the 10 in our group found reverse instead when shifting down to second from third. It seems a stiffer return spring is needed to prevent this embarrassment.

The figures I got with a prototype four-speed-box car showed the speedometer to be a bit optimistic, but correcting for that our normal acceleration figures stack up something like this (in all cases I was probably revving at 6000 or close to it):

| 0-30 | 0-45 | 0-60 | 30-45 | 45-60 |
|---|---|---|---|---|
| 5.3 secs. | 11.9 | 20.5 | 5.8 | 8.5 |

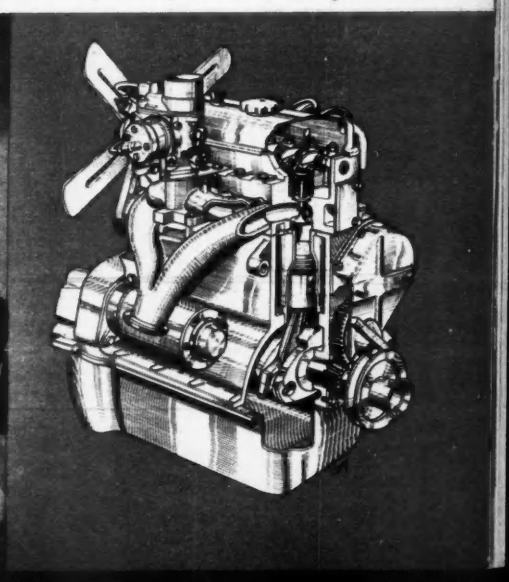
These are hardly astounding acceleration times, but the factory feels they are adequate because they are considerably better than a Dauphine. For the Floridé (France's car), maybe; for the Caravelle (the same car with a different name for the states), I don't know. There are, of course, many factors to consider, among them reliability and just how much more you can get out of an 845cc engine. Renault's feeling is that various modifiers will prepare the kits for those who want more. A possibility is the Judson blower, which cuts the 0-60 time in half on a stock Dauphine. Other kits may follow.

There's another reason for wanting more power for the Caravelle and that is with its sporty appearance and its superior handling to the Dauphine, you'll want to drive it harder. The seating position in itself lends to better control; instead of being hunched over the wheel, you're well back where you can use the leverage of your shoulders to haul it through the turns. Its rack-and-pinion steering is effortless and quick.

**continued on page 60**

*Easy accessibility to the Caravelle's rear-mounted, four-cylinder engine is just one of its virtues. With its wet removable liners, pushrod-operated overhead valves and three-bearing crankshaft, it has proven to be both rugged and trouble-free. Power output has been increased over that of the Renault Dauphine up to 40 hp @ 5000 rpm.*

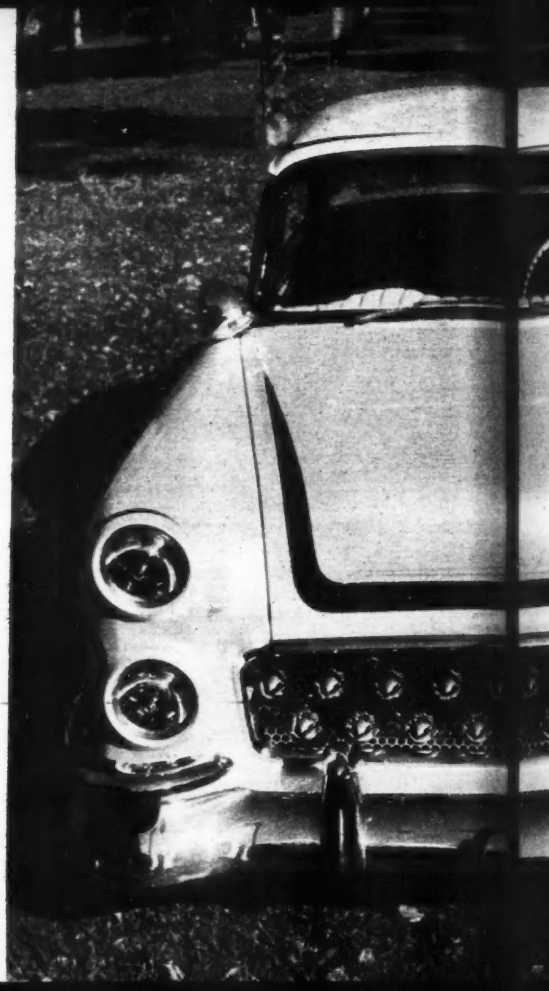







*Popular '55 Chevy lends itself easily to restyling — whether it's a $1500 complete front end modification (below) or a more conservative — and less costly — job as at right with '59 Mercury quad lights ($40, plus $95 labor for each), grille bullets ($1.25), spots ($35)*





*1956 Olds lights ($130, plus parts), Corvette grille ($100 installed), scoops $20 each.*



# Customizing

*Photo Story by George Barris*

**MOST CUSTOMIZING PLANS** represent a battle between dreams and dollars . . . which usually ends in a compromise. There's no reason why it can't be a happy one.

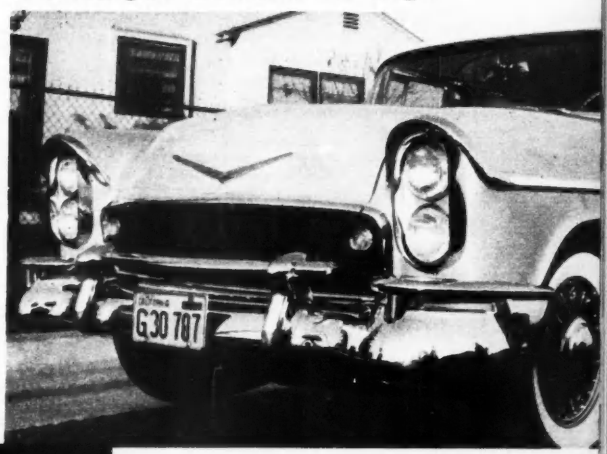
Last month we showed you how to customfit your car's interior — now let's take a look at the outside and a few ways to achieve that look of distinction within your budget.

Two of the most popular cars for customizing are the '55 Chevy (variations of front-end styling are shown on these pages) and the '57 Ford (different rear end treatments appear on pages 42-43). The number of restyling designs for any car, however, is limited only by your customizing ingenuity and





*Above: Extended headlight shades ($35 a side); '56 Chrysler grille bar with mesh and center bars, handmade signal/park lights ($200); molded hood ($45). Below: '57 Imperial lights ($90 each side). Removing horizontal or vertical grille bars enables new designs.*



# g $5 to $500

*Frenched-in grille shell ($85) with unique center ($65); molded gravel pan ($140).*



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the amount you can spend — $5 to $500, or more.

Ways to enliven your side treatment are shown on pages 40-41. If you're lucky enough to own a '59 Chevy, there are dramatic things you can even do to it (pages 44-45).

Before you plunge into customodernizing, however — whether it's just adding bolt-ons or extensive metal work — plan the work carefully. Draw some sketches to see just how the proposed changes will look, and determine parts and labor costs. These pictures and prices will give you some idea of what you can do for how much.



*Two-toning between 1957 Pontiac moldings on this '49 Ford sparks up originally plain side; striping adds color ($40 per side).*

## Customizing – $5 to $500 continued



*1956 Chevy side trim, reversed and upside down, adds long V-wedge design. Painted outline highlights chrome molding ($50 ea.).*



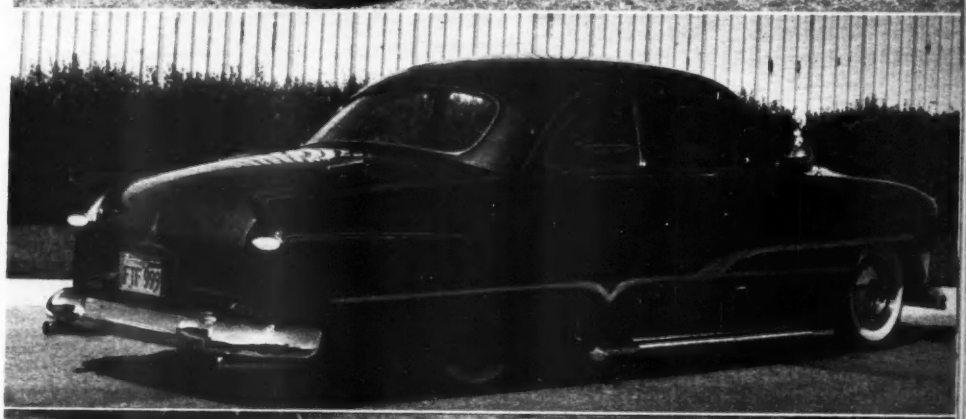
*'57 Chevy side trim in reversed combination can be filled with Mylar tape or Gold'n Chrome for about $20 each. Reversed fender scoops add length to the quad headlight treatment.*



*Handmade from half-oval bar stock, side trim matches body-fender lines, adding length and reducing body thickness; satin-finished extruded aluminum between trim. Cost: $150 per side. Air conditioner scoops in rear fenders, $75 each.*



*'53 Merc sports trim from a '58 DeSoto — changed from right to left, reversed, recut to blend with lines of fenders. T-Bird louvers are installed in scoop opening. Cost: $200.*



*Side panels on '50 Ford are accented with cut-to-fit 1956 Ford trim on bottom, 1953 Dodge trim on top, perforated brass mesh between ($70 ea.).*

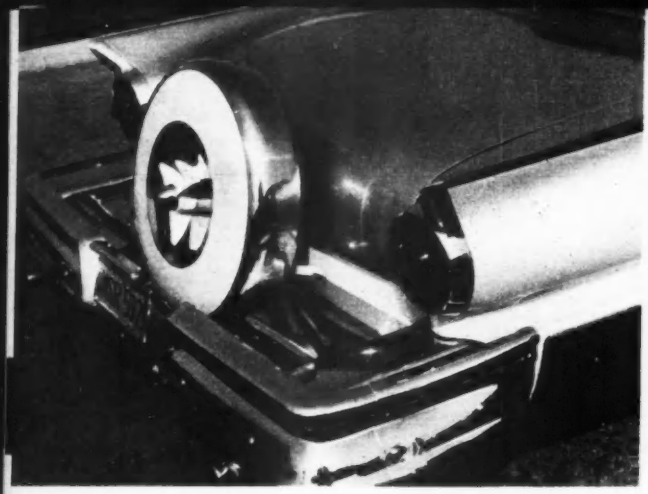


*'53 Plymouth has rear fender chrome of '54 Chevy reversed to match rear scoop opening, then two-toned same color as top. Cost per side: about $20.*

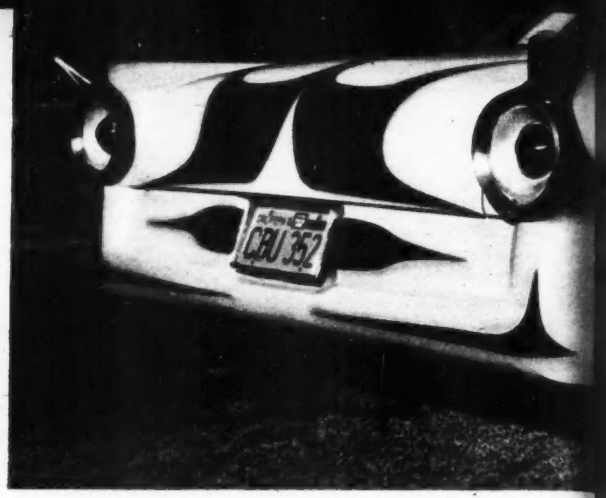
# Side Treatments



*'54 Olds side trim with double lower strip plus Pontiac stars lengthen this '54 Buick ($60 a side). Rear fenders are extended 20 inches; cost is $150 for each side.*



*Continental kit has chrome pans, two-tone tire cover, three blades and small bullet center ornament. The kits range from $150 up. Chrome bolt-on tail light housing is $4.95.*

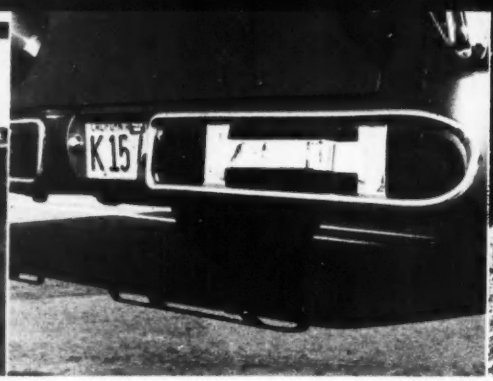


*'56 Ford pickup headlight rims frame bullet tail light ($45). Bumpers have been removed, roll pan frenched in back body section ($85), custom mesh in license plate housing ($30).*

## Customizing— $5 to $500 '57 Ford Rear Ends

continued







*Massive stock rear bumper of '57 Ford can be replaced by tubular nerf bars, designed in split form (center) and mounted on original back bars ($65 each), or formed around the rear fenders with upright bars for added protection ($45).*

*Radical rear (left) has frenched license plate housing ($85), matching peaked tail lights and frenched pan with extended tailpipes — total: $300. (Center) '54 Mercury trim ($1.95) around license plate. (Right) Molded plate housing ($45 up).*

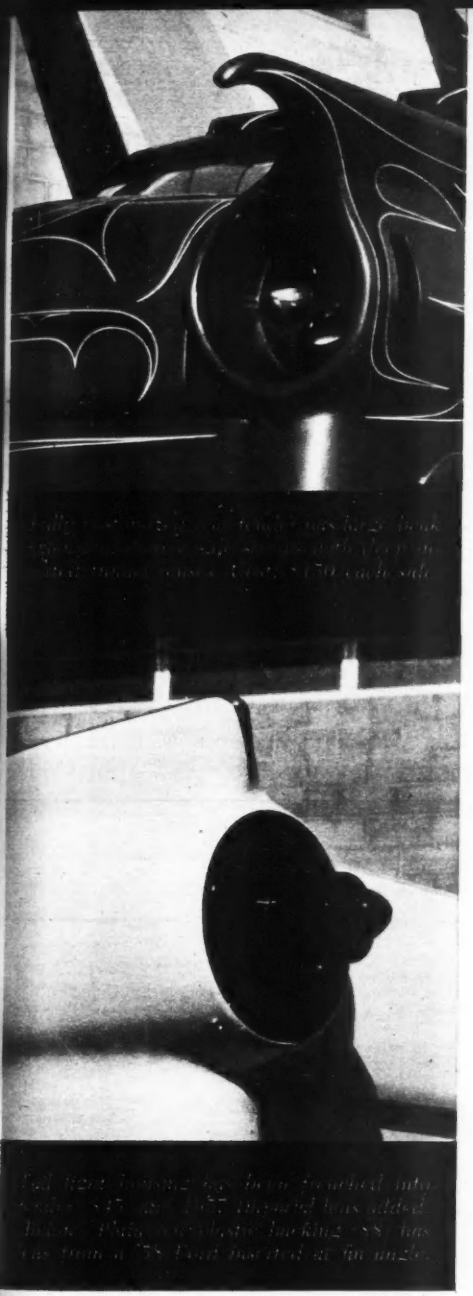








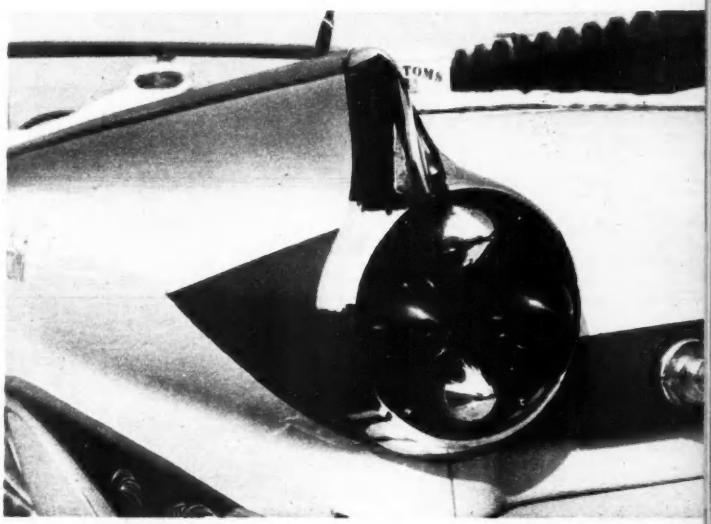








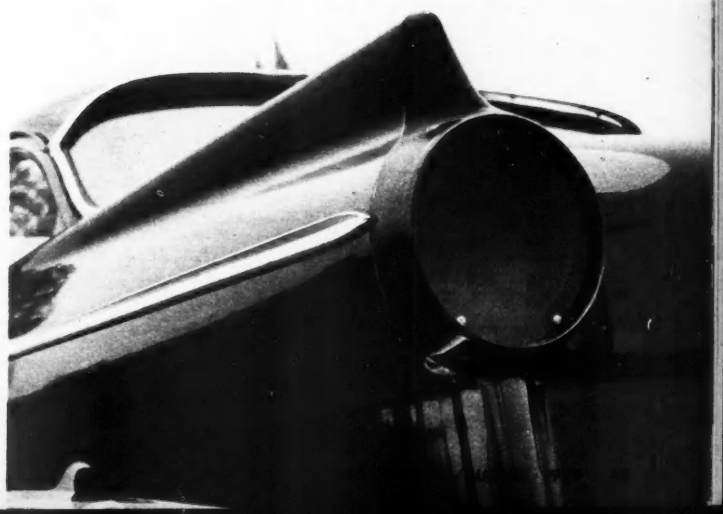
*Edsel tail lights, very popular with customizers, lend a dramatic touch to this '57 Ford. Installation runs $45 for labor, plus cost of the unit. Tail light swapping offers unlimited possibilities.*

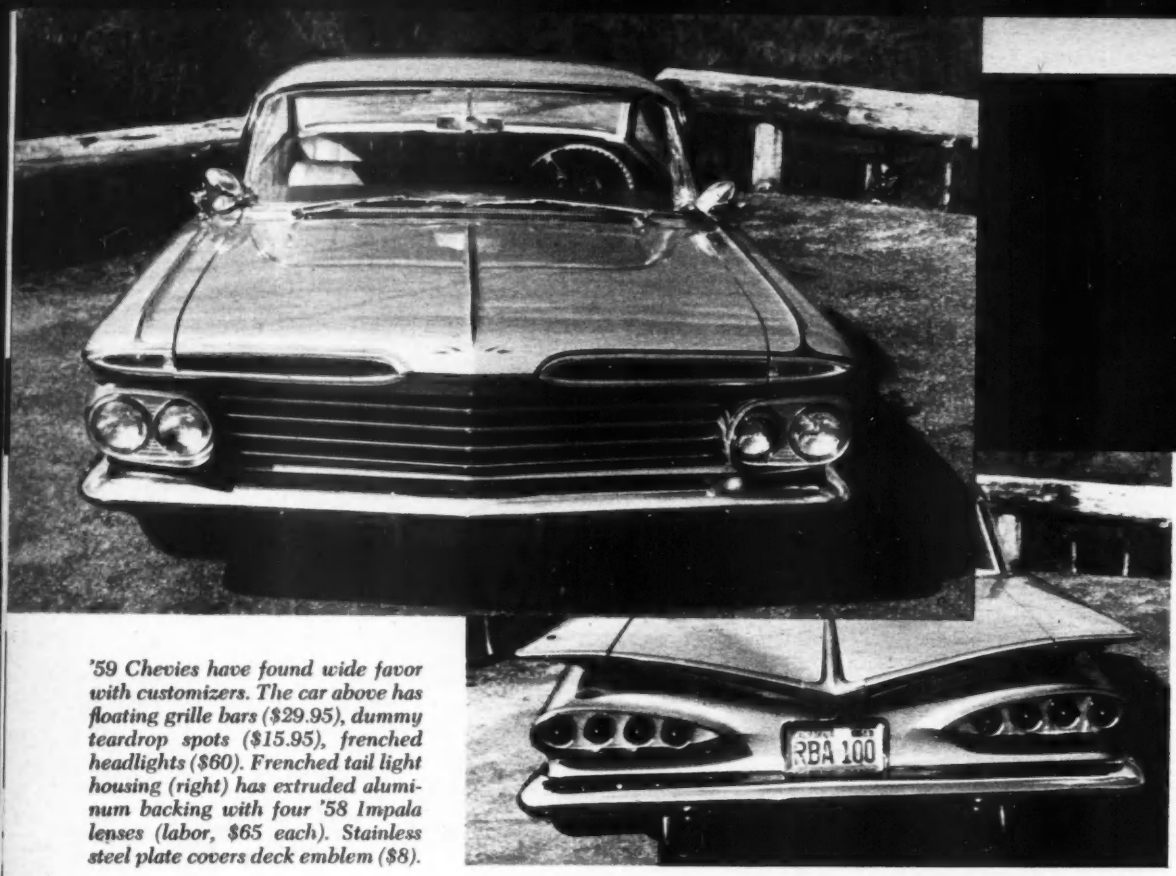


*Four-bubble Satellite tail light, available from California Custom Accessories for $14.95, is popular replacement for '57 Ford lens.*

*Tail light lenses can be fashioned from red plastic or from white with red bulb. Reflective backing should be used for best light.*








*'59 Chevies have found wide favor with customizers. The car above has floating grille bars ($29.95), dummy teardrop spots ($15.95), frenched headlights ($60). Frenched tail light housing (right) has extruded aluminum backing with four '58 Impala lenses (labor, $65 each). Stainless steel plate covers deck emblem ($8).*

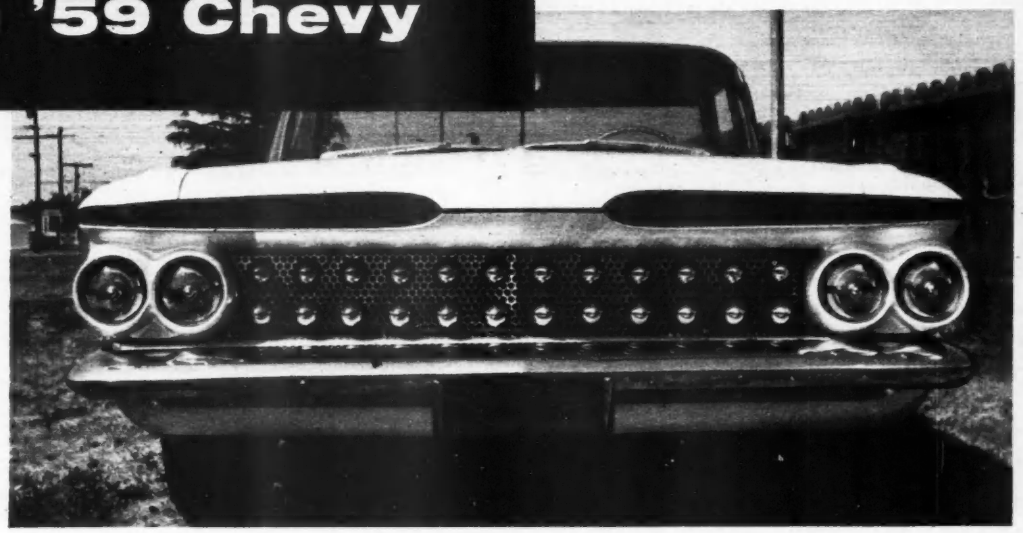



*'57 DeSoto station wagon tail lights have been frenched and extended 5 ins. into original light panels ($85 labor, plus parts). Deck has been molded with section from Biscayne, handmade plate – cost, about $25.*




*'54 Chevy grille has been fitted to '59 shell, extra bars added ($60 for parts, $45 labor). Front air scoops are filled in solid, with rounded hood corners—the cost: $90 for each side.*

# Customizing – $5 to $500 the '59 Chevy



*'59 Merc headlight rims are extended and frenched ($90 each, Lucas beams $8.90); perforated mesh and bullet grille ($65); scoops are frenched and extended across fenders, with rods and metal inserted ($160).*



*Frenched tail light housing has eyelids extended 4 ins. The plastic lens transmits light into frosted plastic teeth. Total cost: $120.*



*Three '59 Cadillac lenses ($2.50 each) and extruded aluminum backing are simple bolt-on treatment.*

# custom car contest

PROJECT IDEAS

FOR CONTEST INFORMATION SEE PAGE 44



**ORIGINALITY IS THE KEYNOTE** of the Lanier, finished in 1956 but consistently modified since then. A. J. Lanier, Col. USAF, retired, of Arcadia, Calif., started with plans made in 1955, using a bare frame, adding the suspension units, then having various body parts made to his drawings. The hood and nose were patterned after a 300-SL and Ferrari. With the help of several body builders (including Emil Diedt of Reventlow Automobiles), the car was completed in April, 1956. Then came the modifications: the front half of Porsche fenders bred to the existing fenders; rear fenders extended with fins; and bullet-like tail lights added to the new fenders. Finish is in DuPont Lucite Black. The facelift was completed in one month.



*During the initial stages of working on h car, Lanier says, "Mrs. Lanier and I did a the mechanical assembling in our garage.*



The Lanier, licensed as such in April 1956, uses some parts from a Thunderbird, including windshield, doors and top. The ventilator scoop was added during the facelift. Lanier says he is quite satisfied with his effort and does not begrudge the money spent on the car. Further, "I don't think anyone will spend the time or money to duplicate it, so it will always be one-of-a-kind." With the highly modified engine Lanier originally used a stick shift, "... but after tearing up three gearboxes and four drag clutches, I put in a heavy automatic." Since that time, no trouble. Previous to this the car has never been entered in shows or in any competition. Lanier is awarded top place in the Senior Class in this month's Project IDEAS entries.

## Senior Designer Class

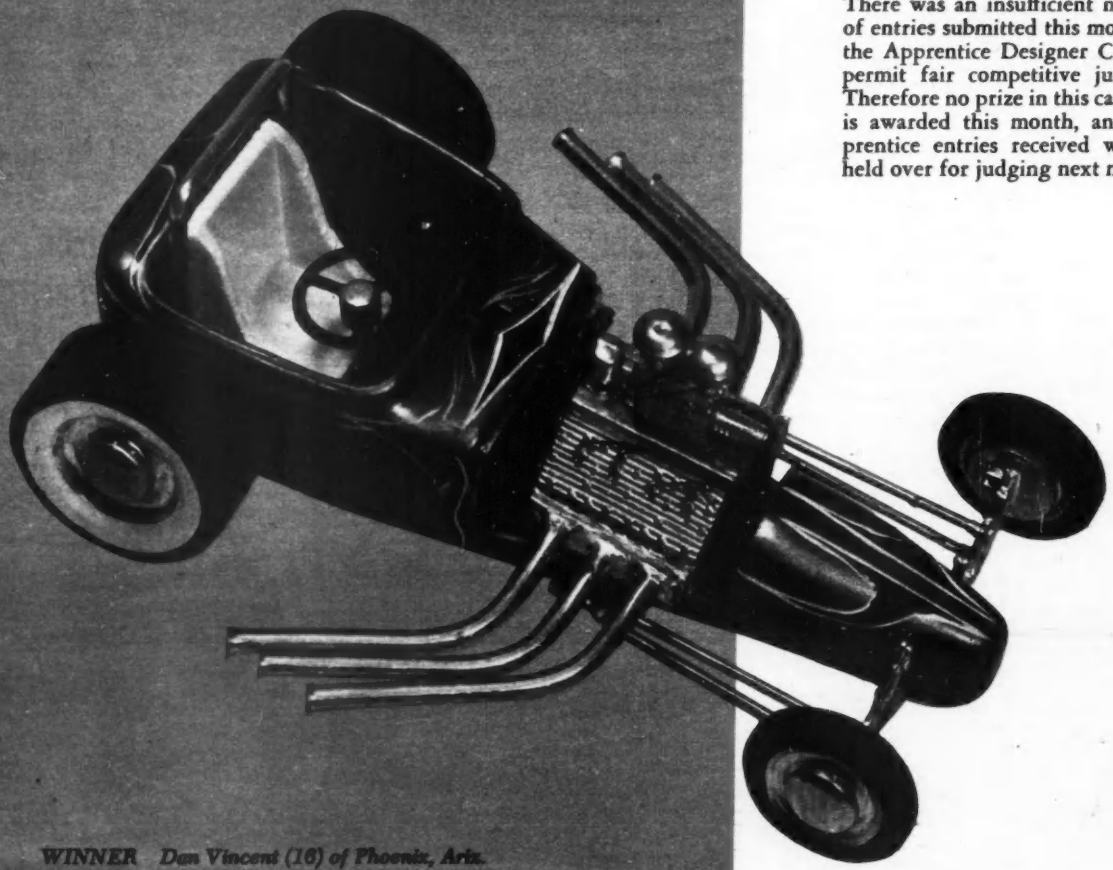
*Lanier is justifiably proud of the interior, with its pleated upholstery and instrument cluster (". . . just to please an old pilot").*



# custom car contest

CONTINUED

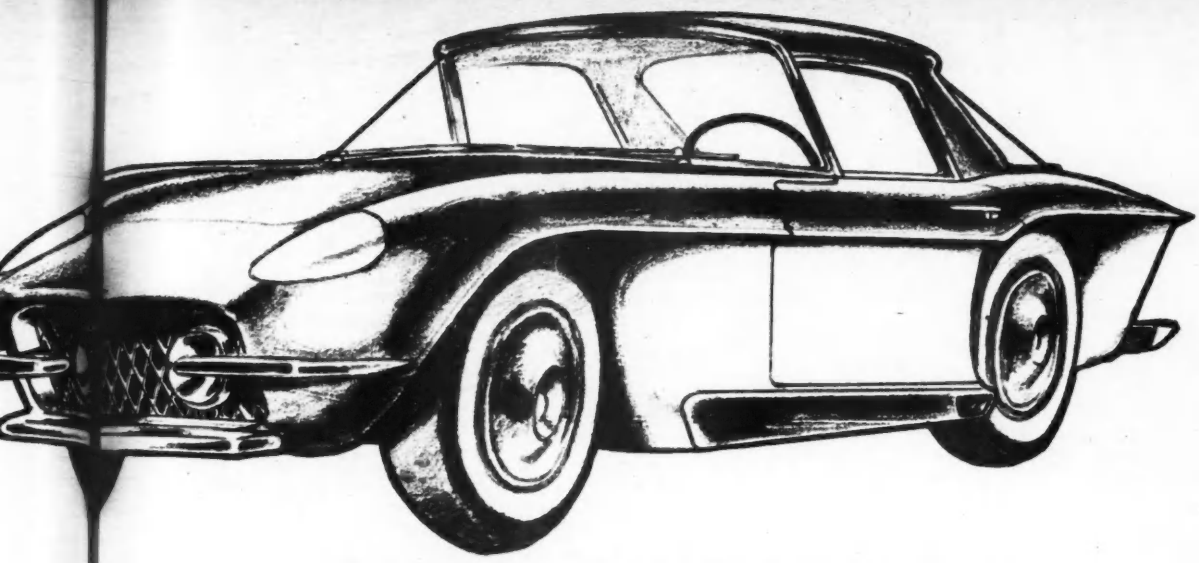
## JUNIOR DESIGNER CLASS



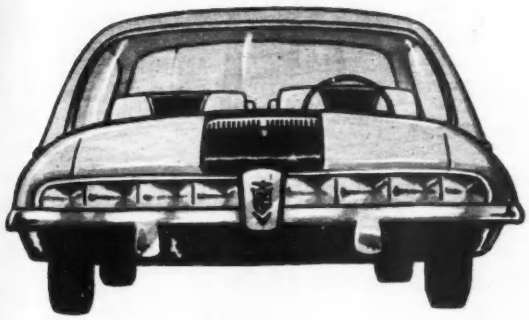
*WINNER Dan Vincent (16) of Phoenix, Ariz. took a basic Revell kit and modified it with hand-formed balsa wood parts. Supercharger is a bolt and nuts; pedals are made of stiff wire; spark plug wires and fuel lines are thread; rear "slicks" are two tires welded together.*

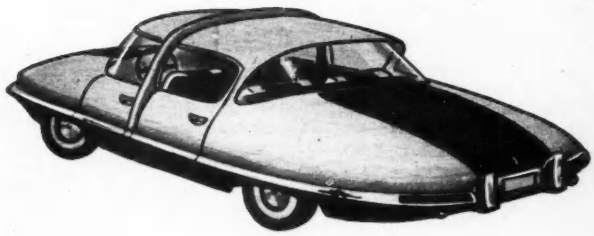
**APPRENTICE DESIGNER CLASS**

There was an insufficient number of entries submitted this month in the Apprentice Designer Class to permit fair competitive judging. Therefore no prize in this category is awarded this month, and Apprentice entries received will be held over for judging next month.



*Worthy of mention in the Senior Designer Class is this rendering of a new body style for Corvette by Thomas Zunkel (22) of Park Forest, Ill. Wheelbase is the same, but height has been increased to 52 ins. Low-beam headlights are in the fenders, high-beam in the grille. The "boxes" on the lower sides of the body house the dual exhausts, with the mufflers in the engine compartment. Zunkel would like it to have a hot V6.*





*Jon Kennedy of North Little Rock, Ark. submitted these drawings of his Falcon I, a "safety design car." Features: wrap-around bumper, bucket seats for all four passengers, integral roll bar, rear-mounted engine, horizontal bar-type headlights.*


**PRIZES AWARDED EVERY MONTH**

SENIOR DESIGNER CLASS — $100 Savings Bond
(Open to all entrants)

JUNIOR DESIGNER CLASS — $50 Savings Bond
(Entrants aged 16 or under)

APPRENTICE DESIGNER CLASS — $25 Savings Bond
(Entrants aged 13 or under)

**GRAND PRIZES (awarded at year's end)**

FIRST PLACE: A 16 x 32-foot $3500 Bather Williams swimming pool. Installation included.

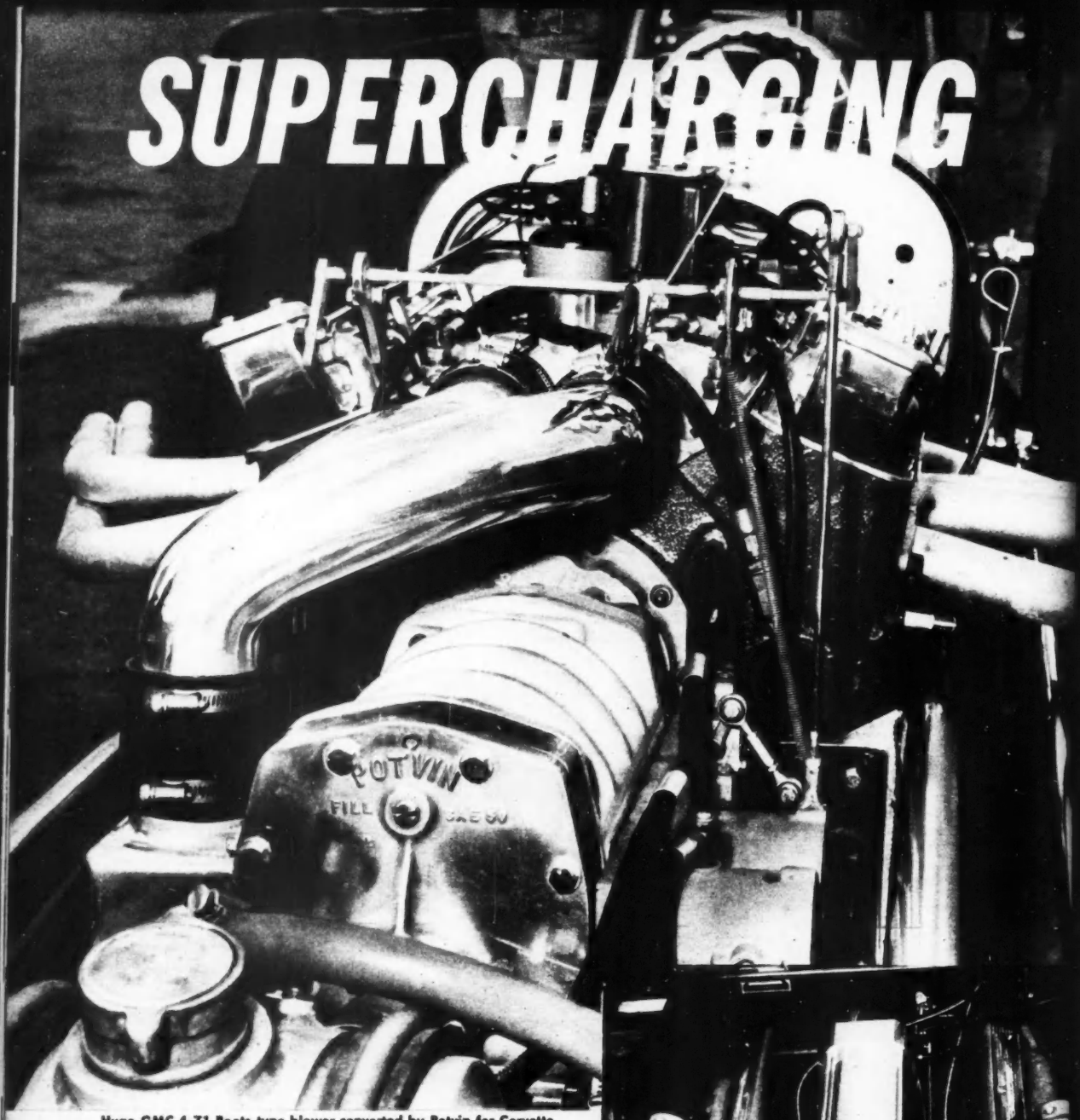
SECOND PLACE: An all-expense-paid trip for two to Washington, D.C.

THIRD PLACE: Brake linings for your car for the rest of your life.

Prizes are awarded jointly by Revell, Inc. and Motor Trend

For Contest Entry Blank, Rules, or more information, write: PROJECT IDEAS, P.O. BOX 272, VENICE, CALIFORNIA

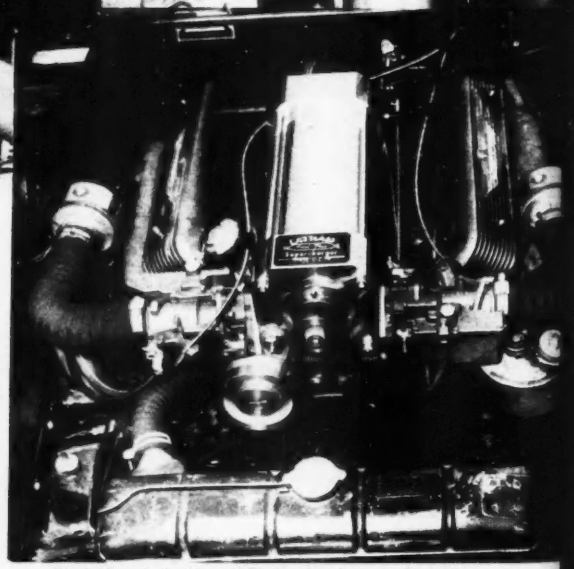
# SUPERCHARGING




Huge GMC 4-71 Roots-type blower converted by Potvin for Corvette.

GETTING MORE GO

No. 5 of a series



Big Latham bolted to a T-Bird makes for real dig in the quarter.

uarter.

# The easiest way to get gobs of low-speed torque is to bolt on a blower—and it's also the cheapest horsepower you can buy!

*by Dean Parker*

**THERE ARE TWO KINDS** of automobile performance enthusiasts: those who get their horsepower with a supercharger, and those who use every *other* trick to get it.

Unfortunately the twain may never meet. Very often you'll find the "unblown" enthusiast going out of his way to condemn supercharging. On the other side is the "blower bug." Chances are if he's ever had a supercharged engine really running right he'll never be quite satisfied with atmospheric induction again. He's a wide-open target for every bit of new supercharging equipment that hits the market.

We don't intend to take sides on the question. Our purpose is only to try to guide you in deciding whether it's practical for *you* to take the plunge into supercharging—and, if so, what equipment is presently available. . . .

**WHAT IS SUPERCHARGING?** The most important factor determining the horsepower output of an internal combustion engine is the *weight* of fuel/air mixture it can efficiently burn in a unit of time. This is why we put a hot camshaft, big valves and dual carburetors on an engine—so it can draw in a heavier, denser charge on the intake stroke. We increase the bore and stroke so it will gulp more charge every revolution. But all these tricks depend on *atmospheric pressure* to push the fuel/air charge into the cylinder when the piston goes down. If we just put a little artificial pressure on the mixture in the manifold, things *really* start to happen. A positive pressure of seven lbs. per square inch—about half of atmospheric—will raise horsepower nearly 50 per cent; a 15 lb. "boost" would theoretically double the hp. The British once developed a 91-cu.-in. engine that kicked out 520 hp with 70 lbs. boost pressure!

A supercharger is nothing more than a high-capacity air pump to pressurize the fuel/air mixture in the manifold, and force it into the cylinders on the intake stroke. Theoretically, horsepower increase is limited only by the thermal and shock strength of the engine parts and the octane quality of the fuel, but when everything is set up right it's the ideal way to hop up an engine.

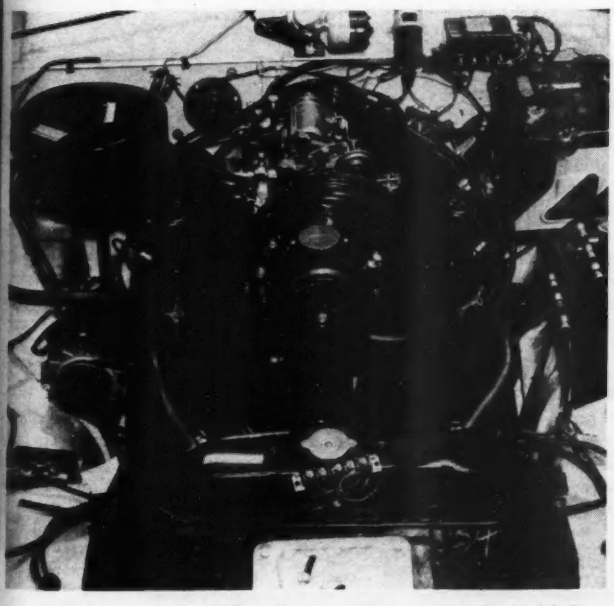
There are problems of durability and maintenance if you get too greedy about pressure. Let's face it—a stock automobile engine was never designed to take the heat and pressure loads of a hefty supercharger pushing 15 lbs. boost. So unless you are building for all-out competition only, be content with half that pressure. If the fuel mixture happens to be a little on the lean side, or if the plugs are too hot and cause pre-ignition, you can blow up a good engine quick as a wink.

**TYPES OF SUPERCHARGERS** Before we get down to actual cases let's take a quick look at the four basic types of superchargers that are presently available in bolt-on kits for stock passenger cars. First, the "centrifugal" type has an impeller capable of speeds in the 50,000-rpm-plus range that scoops the air in at the hub and whirls it off into the outlet casing at high velocity; the velocity energy is converted into pressure energy when it slows down in the outlet.

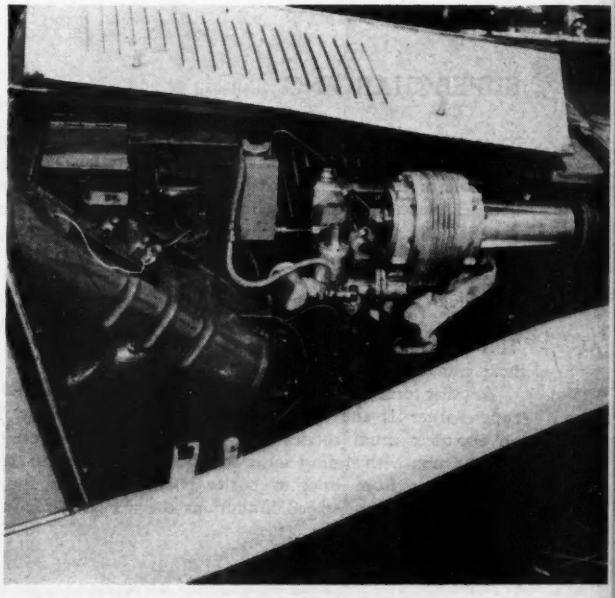
The "axial-flow" blower works on the principle that air is accelerated to high velocity in a straight line (parallel with the axis) through eight to 12 stages of fan blades, divided by stationary guide vanes set to keep the air going straight. These rotate at very high speed. Both of the above types of compressors are characterized by a pressure output rising swiftly as the rotor speed goes up—and, by the same token, dropping off fast at lower engine speeds.

A third type of compressor is the "Roots" type. This is not

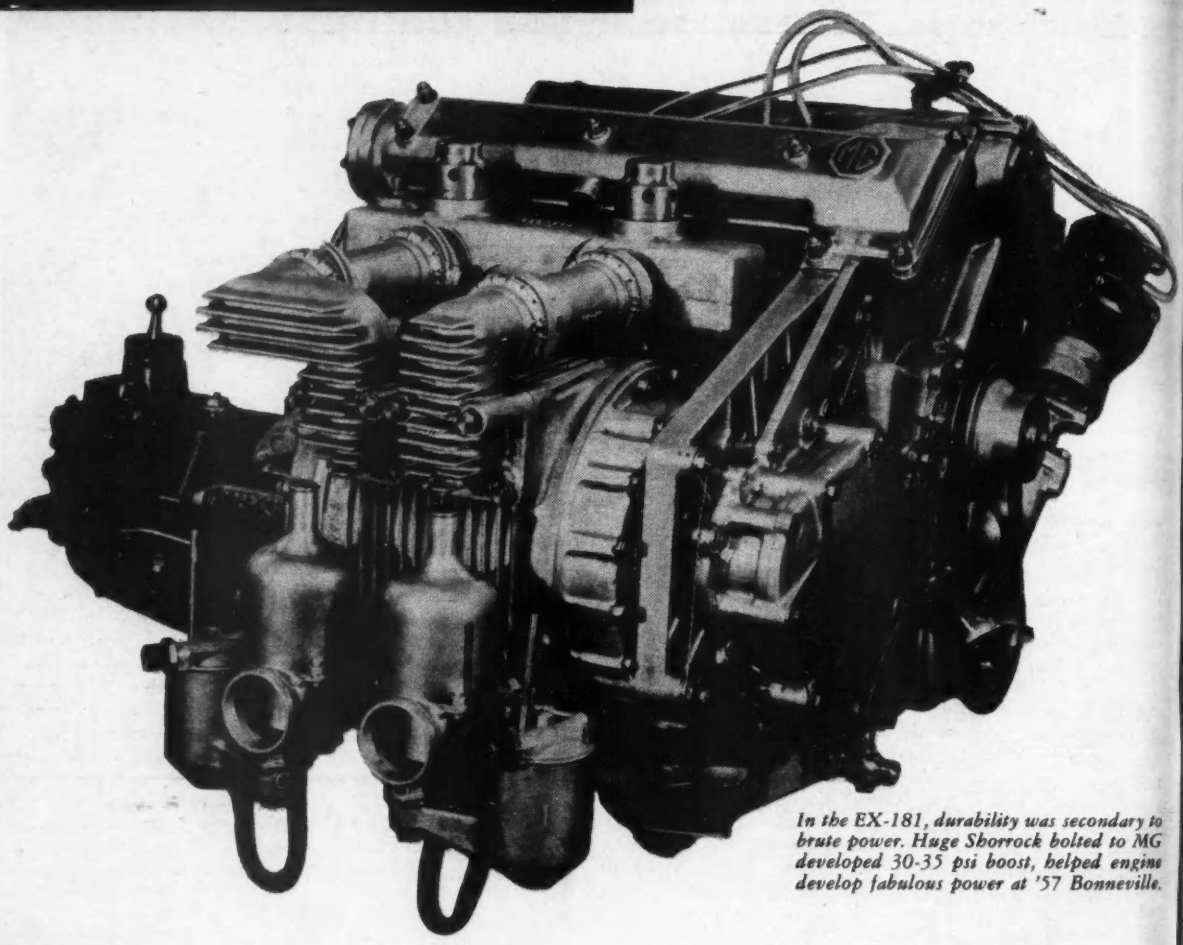
**continued on next page**



McCulloch blower was factory option for Studebakers.



Even this traditional MG-TC responds to the Sherrock urge.



*In the EX-181, durability was secondary to brute power. Huge Shorrock bolted to MG developed 30-35 psi boost, helped engine develop fabulous power at '57 Bonneville.*

## SUPERCHARGING continued

really a compressor at all, but only a form of paddle pump that pushes air into the manifold in greater volume than the cylinders displace, therefore increasing the pressure. The Roots type has interlocking-lobe rotors that rotate with a small clearance in an oval-shaped housing, pumping individual slugs of air into the manifold (something like a gear-type oil pump). This blower runs at much lower speed, near crankshaft rpm.

Another form of "positive-displacement" supercharger is the "vane" type, where an eccentric drum rotates inside an external drum, with sliding vanes that pump slugs of air from inlet to outlet ports. Because of size and speed limitations the vane-type compressor is suitable only for relatively small engines. Both these positive-displacement blowers are less efficient than centrifugals and axial-flows; that is, they require more power to drive and heat up the air more—but they give better pressure at low engine speeds.

Now let's see how the principles are applied in currently available supercharger equipment.

**BLOWING THE STREET ENGINE** There are really only two basic types of superchargers presently available for U.S. passenger car engines that were specifically designed for street and highway use—the Paxton-McCulloch centrifugal and the Latham axial-flow. Both are available in bolt-on kit form for most late U.S. engines (see list at end for addresses and prices).

The big feature of the McCulloch is a unique variable-ratio drive, operated by air or oil pressure, that automatically speeds up the rotor at low engine speeds when you open the throttle wide—thereby increasing the boost pressure and torque. The early "VS" model (still sold for some engines, such as Volvo, flat-head Ford and Renault) did this by moving one flange of the upper pulley in and out to change the effective diameter for the V-belt drive. Later "VR" models vary the axial location of the races on the

internal planetary ball step-up drive, to change the drive ratio. In both cases the blowers will maintain a steady 4½-6 lbs. boost pressure from about 3000 crankshaft rpm and up to the mechanical limits of the engine. Medium-speed punch for passing is excellent.

On the other hand, the planetary ball drives in VS and VR McCulloch models are limited on the amount of horsepower they can transmit without slipping . . . and, of course, slipping will ruin any kind of "friction" drive in a hurry. This means, in effect, that these blowers can be overloaded if you put them on an engine too large for these models. Not only will you get very low boost and power increase, but you might wreck the planetary drive in a few miles if you razz the engine. Use this rule of thumb: Early VS models should not be used on any engine with a stock power rating above 225 hp, and the VR should be limited to 325-350 hp ratings. These are *stock* ratings; if engines of these ratings have been hopped up appreciably (using hot cams, big valves, bore and stroke, etc.), use the DO model, which will handle everything up to and including a 743-cu.-in. Cummins diesel.

The VS and VR models are mentioned because there are a lot of them on the used market. Paxton's DO model should be used on the late model engines for smooth trouble-free operation.

The Latham has no internal step-up drives; the rotor is driven at approximately five times the speed of the crank through a rather antiquated *flat belt,* running on flat pulleys with flanges. These belts are constructed of nylon cord, wire reinforced, rubber coated, and run in widths from one to 1¾ inches, depending on the size of engine. Used sanely out on the road, with only occasional full-throttle bursts up to high rpm, these belts should last up to 10,000 miles if properly adjusted. Under hard competition conditions, and when supercharging a free-breathing all-out competition engine, it is necessary to use a special friction dressing on the belt to prevent excessive slip—and this tends to shorten belt life considerably.

There are other things to consider in choosing between the Latham and McCulloch: The Latham flat belt is very critical on pulley alignment, otherwise the belt will creep forward or back under power and wear off the edges against the pulley flanges. The large diameter of the crank pulley with the Latham (up to 10½ ins.) sometimes requires modifications to the steering system to fit it into modern car engine compartments. This adds to the installation job. The McCulloch uses the stock carburetor and throttle linkage. Latham uses two or four horizontal (side-draft) Carter carbs on the blower housing, with special throttle linkage. With either blower we have more air available, and larger jets must be installed. Remember, to get more power we must burn more fuel.

In general, the McCulloch installation job is much simpler and quicker than the Latham. The Latham is considerably more expensive than the McCulloch (almost double) because of the great amount of machine work and extra carburetion. The McCulloch gives better medium-speed torque (relative to peak hp) with its variable-speed drive—but the Latham is not at all bad in this respect. So you pick 'em from there!

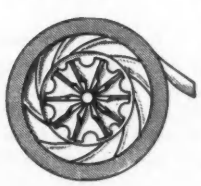
**THE STREET-STRIP ENGINE** With the rising popularity of drag racing in this country there are a lot of younger car owners who want an engine that can be an occasional Sunday winner in one of the "Gas Coupe/Sedan" classes at the strip—and still take them around town all week. They're apparently willing to put up with a considerable loss of flexibility and other conveniences to get this, as long as the thing will start up in the morning, idle after a fashion, and chug along at low speed in traffic.

So where does the bolt-on supercharger fit into this picture?

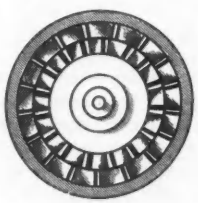
In just the last year several West Coast speed equipment manufacturers have brought out kits to mount standard GMC Roots-type diesel truck blowers on the top of various U.S. stock V8 engines. Originally these installations were intended strictly for all-out competition engines —for dragsters, roadsters, Bonneville cars, speedboats, etc. However, the fantastic mushrooming popularity of the GMC blowers (fed by recent competition successes) may encourage some accessory manufacturer to develop an installation for the street. As this is written we know of no company that yet has a complete street kit available. But a number of fellows have tried to improvise street installations from the competition kits, and more are bound to try . . . so a few words on the subject may be in order.

The problem is obviously the 15 or so inches clearance you need between the engine and hood to fit in the GMC blower

## BASIC TYPES OF SUPERCHARGERS

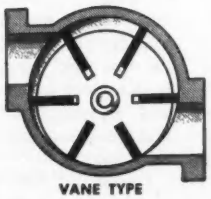


CENTRIFUGAL

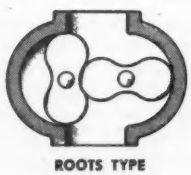


AXIAL FLOW

**Centrifugal and axial flow units work on same general principle: intake air is fanned by blades, accelerated. When blocked in ports, velocity is converted to pressure. Both units work well at top end, drop off sharply at low speed.**

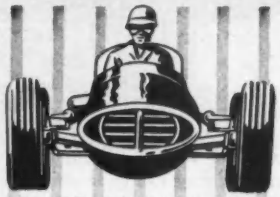


VANE TYPE



ROOTS TYPE

**Vane and Roots-type compressors are positive-displacement type. Slugs of air are squeezed as chamber gets smaller. Since more air is pumped than engine uses, compression builds pressure. Both work well at low end, but fall off at high rpm.**



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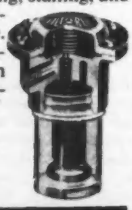
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# GETTING MORE GO

## SUPERCHARGING continued

and top mounted carburetors. On a few cars it may fit, but in most cases you just have to chop a hole in the hood and let the carbs stick out. Special side-draft manifolds could be built that would permit the carbs to be mounted low off to one side, but problems of cold-starting and throttle response would have to be solved. So, if you want to use a GMC blower for a street-strip engine right now, you have to butcher your hood and adapt your own carb mounting and throttle linkage.

Otherwise the various GMC setups look quite practical for the street. The blowers themselves are high-quality items, precision-built, but they were designed as diesel scavenger pumps to operate at about 1800 rpm. Turning them faster shortens their life considerably. The special blower manifolds provided with the kits give a good solid mounting base. The three- and four-belt drives seem to have sufficient capacity to handle the power (which will exceed 60 hp in some cases), and belt life is fair—if you use good cable-reinforced belts. Some of the later kits employ the Gilmer timing belt, or even chain drives; these would be fine for competition, but we feel a little built-in slippage is a good safety "cushion" for a street engine. Used blower units are widely available for $100 or less, and kit prices don't run much over $300. But *unless you are lucky*, they usually require lots of work to put them in top condition. Unfortunately the most popular GMC blower model for cars—the medium-size 4-71—is the least popular for trucks, so they are getting pretty scarce; good used ones now run $150 or more. But it's still a "cheap" power boost in terms of hp per dollar if you don't count the labor necessary to customize the installation.

**THE SMALL IMPORTED CAR** The lack of acceleration for passing at highway speeds is an ever-present problem with the small, low-powered imported economy car. Supercharging can be a very practical answer here because many of these small engines have been purposely designed with very small ports and valves to improve fuel economy; in this case, pressure induction is a more effective performance booster than the usual hot cams and dual carbs. Also, the blower power requirement is very low on these small engines, so belt drive problems are not acute. These small car superchargers can give a nice 50 per cent increase in hp, no appreciable loss in fuel mileage (unless you drive a lot harder than you have been), and will give many, many months of reliable service if properly maintained.

A note here about an often-asked question concerning the harm blowers might inflict on small engines. There are only so many horsepower hours in any mechanical machine designed to do work. The more it does in a shorter period of time, the shorter its life. Many small-car owners install a blower after they have thrashed the engine thoroughly. If this is the case, check those little engines well before putting the additional load of several pounds of boost on tired bearings, pistons, rings, valves, camshafts, valve springs or cranks. Be happy with your blower—but give the engine a break. A thorough check now can save dollars later.

The only American blower kit made for the small cars is the Judson vane-type, available for Volkswagen, Renault, MG-A and 190-SL. Several Roots- and vane-types are made in Britain and Europe, but are not widely distributed in this country. Check your foreign car parts dealer. We don't know of a dog in the bunch, and probably the Judson is the most practical anyhow because of the easy availability of parts. Think it over.

**SO WHAT TO DO?** It should be pretty obvious at this point that supercharging is practical for a non-competition street machine. If you're an *average* enthusiast —one who likes to tinker with a car a little, but who demands flawless reliability and smooth, quiet street running—don't get greedy and try to run maximum pressures. If you can spend only $100 for your hop-up job, you can't *afford* supercharging, at least on a big American engine. As we see it, the man who should consider the bolt-on supercharger kit is the man who wants altogether outstanding performance in his car, both for the road and competition. The supercharger can also be considered as a piece of "speed equipment," if used in conjunction with a special camshaft, ported heads, big bore and stroke, ample carburetion, clean exhaust system and hot ignition, for all-out dragging. This leaves the possibility of

some pretty impressive hp-per-cu.-in. figures for the man who is willing to spend the time, money and effort to build up a hot blown engine . . . and such figures can yield consistent wins at the dragstrip. But for the man in the street who just wants a little more performance, with the least fuss and bother, a supercharger is definitely the way to get it.

Here are a couple of last precautions: You don't have to make a lot of other changes on an engine if you decide to try a bolt-on blower kit (like special ignition, etc.). But always remember that the higher stock compression ratios were never intended for blower pressures used in competition. And always be very careful about any lean mixture condition in your carburetion. Better too rich than too lean with a blower! /MT

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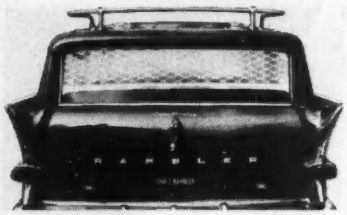
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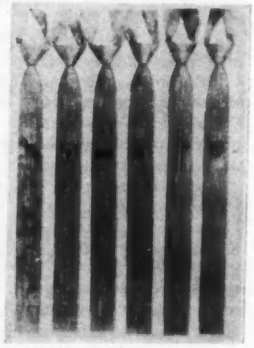
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proof screening plus heavy wire mesh to protect against theft and keep the small ones from falling out. Easily installed, easily removed. Inquire at your dealer's.

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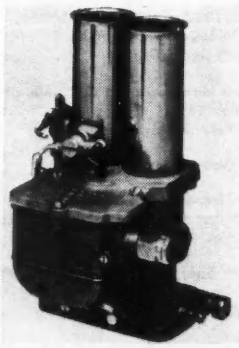
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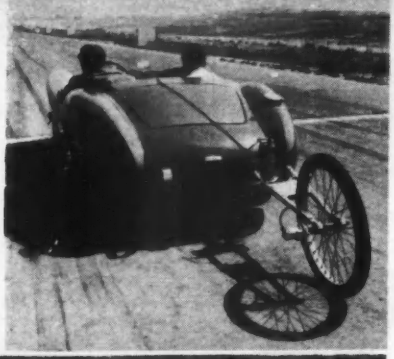
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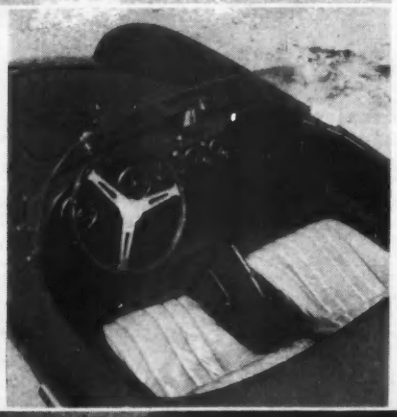
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# TESTING THE DEVIN SS

**Planned as a limited production sportscar, it offers performance, style, great handling and ride at a competitive price.**

*by Wayne Thoms*

**THE AUTOMOTIVE WORLD** is littered with the carcasses of semi-customs intended for production by small independent firms. Most of these cars represented substantial outlays of cash, time and effort and many showed real promise. Unfortunately, most are abandoned quietly after the initial splash of publicity and enthusiasm. Happily, there is every reason to believe that at least one such auto manufacturing project—the Devin SS—will be carried through to completion as planned. Both the manufacturing plans and the car are exciting. Bill Devin, a pioneer in the building of fiberglass bodies and a man with the experience and facilities to back up his proposals, is going to build an initial run of 150 completed cars. With the chassis currently being built at the rate of three per week in his factory in Ireland, final assembly is being carried out at his El Monte, Calif. plant. Distribution will be handled by the Evans Co., Pasadena, Calif.

Intended as a street machine, the standard Devin will be fitted with Corvette's 220-hp engine—single four-barrel carburetor, a four-speed Corvette gearbox, Girling disc brakes inboard at the rear, Dunlop R-4 tires and de Dion rear axle.

It is a surprising car, the surprise hitting you in the back at the first punch on the throttle—as we did recently at the Riverside Raceway. Acceleration is

*Getting off the mark from a standing start, upper left, wheelspin can be induced but adhesion is remarkably good due to good balance and de Dion rear axle. Devin SS looks good from any angle; rear quarter emphasizes quick-filler gas cap for two 15-gallon tanks, external mufflers and rear bumper which is sturdy but small. Interior is well arranged, layout functional. Body roll during hard corner is kept to a minimum.*



fierce and it feels as much at home on the race course as if it w. ? an all-out competition machine. Yet, for puttering around city streets, it is just as docile as required.

Acceleration, braking and handling should please the most discriminating. Our performance table tells the story of how quickly the car will travel in a straight line from a standing start, but it is difficult at best to describe the exhilaration from running the engine to peak rpm in gears, sailing through the end of the quarter-mile at just over 6000 rpm and just under 100 mph. Our times were run with 3.7 to 1 final drive ratio, not ideal for best acceleration. But considering combined weight of 400 lbs. for passenger and driver plus 100 lbs. of fuel, these figures represent good acceleration.

## ACCELERATION

| | |
|---|---|
| 0-45 | 4.2 secs. |
| 0-60 | 6.8 |
| 0-100 | 17.9 |
| ¼-mile | 14.73 & 95.5 mph |

Brake pedal pressure is high and something which requires practice to use properly. But they stop! We made maximum acceleration runs to 100 mph with maximum deceleration to dead stop. After three runs we quit because it was clear that there would be no appreciable brake fade. Average time to 100 mph was 17.9 seconds. Another 7.3 seconds found us back to a straight-line no-skid stop for a total of 25.2 seconds.

A de Dion rear axle is one of those items which everybody praises but few people actually have the opportunity to try out in situations where it can be advantageous. It has a characteristic all its own and is quite an aid to roadholding. Get into a hard corner, set the rear end toward the outside of the turn and hold it with throttle. A little too much corner and the next maneuver is a spinout, but with a de Dion (and the Devin) natural recovery is possible by relaxing throttle pressure. It is not quite, but almost as easy as reading about it. Body roll while cornering, incidentally, is very slight and steering is practically neutral. One of the car's inconveniences related to driving is clutch pedal position. We found it necessary to use the heel to disengage rather than the preferred ball of the foot position.

Seats are extremely well-positioned buckets which have little padding but are so well formed that they need little to be quite comfortable over long distances. The ride is sportscar-like — that is, firm but not bone crushing. Adding to cockpit arrangement are instruments built to Devin's specifications by Stewart-Warner, white numerals on black.

The rear deck holds a spare tire and enough space for incidental luggage, probably ample for every use to which this car will be put.

We were pleasantly surprised at the lack of wind buffeting behind the curved plexiglas windshield. The production run cars will have safety glass. The lack of any sort of a top raises an interesting point which makes it quite clear that this is a specialty car, built for the man who appreciates something different and who doesn't depend on this machine for his rain-or-shine transportation. Hard or soft tops will be made available, but why? It's an honest sportscar just the way it stands. And we don't believe that the performance and fun can be duplicated from Detroit or overseas for less than twice the $5950 delivered price.





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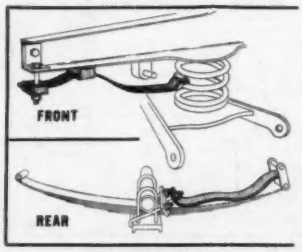
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# CARAVELLE

continued from page 37

When I found out later that it has 4½ turns lock-to-lock, I flipped! It seems more like two.

Though I drove three different prototypes I can't be sure whether the car oversteers or understeers, for they all reacted differently. This was possibly due to tire pressures, the camber weight loading and/or other factors. In any event, one car would begin to squeal in a tight turn, the rear end would break traction and you could quickly convert it into a nice four-wheel drift through the rest of the corner. Another car broke loose with no indication until I became accustomed to forcing it to drift through every corner. The third was more like the second, but had more power, so actually felt the best of the three. Renault says that their production cars will be set up like the latter two, or just about neutral as respects over- and understeer.

Riding as a passenger, I found that I'd rather drive. I'd much rather in any respect, but I felt that the car was more a driver's car than a passenger's car. I was more aware of corners (though you don't have to brace yourself unnecessarily), the choppiness in the ride was more noticeable and I got just plain restless wanting to take over the wheel again.

Stepping out of a Dauphine into a Caravelle, you won't get the same fuel economy (of up to 43 mpg) because of two reasons: it's a heavier car and you'll have your foot in it more. On the first day's trip to Brittany, when the five cars were being driven close to flat-out most of the time, averaging 58 mph, the average was 30.6. The following day, driven slightly more conservatively, they averaged 33.6. There would probably be no difficulty at all in consistently getting over 35 mpg—if you wanted to.

In general I like the Caravelle very much —where I drove it, in France, and as a driver, not a passenger. I wonder if I'd like it as much in the States? In France I was able to drive it flat-out on the highway and take it through turns the same way, thereby bringing out the best features of the car. Even with its limited horsepower of 40, I could pass most cars and stay with the rest, though many times I wished I'd had more torque to get around a string of cars.

In the U.S. it would be another thing. It's my feeling that to give it the performance to match its handling it should have another 50 per cent power boost. Yet despite my wants, they'll probably sell all the 1000-2000 monthly they'll start pouring into the U.S. in late '59. I'd be willing to bet that the majority of them will be sold to women, or will be used by them mainly.

Renault's hopes for the Caravelle's sales potential in the U.S. are reflected in the appraisal of Johnny Green, Western distributor, who feels that the new model will account for about 25 per cent of Renault purchases in 1960.

The style, the colors, the size and the optional Ferlec electric-clutch (no clutch pedal) will all be strong sales appeals. With an automatic transmission, they'd sell even more. /MT

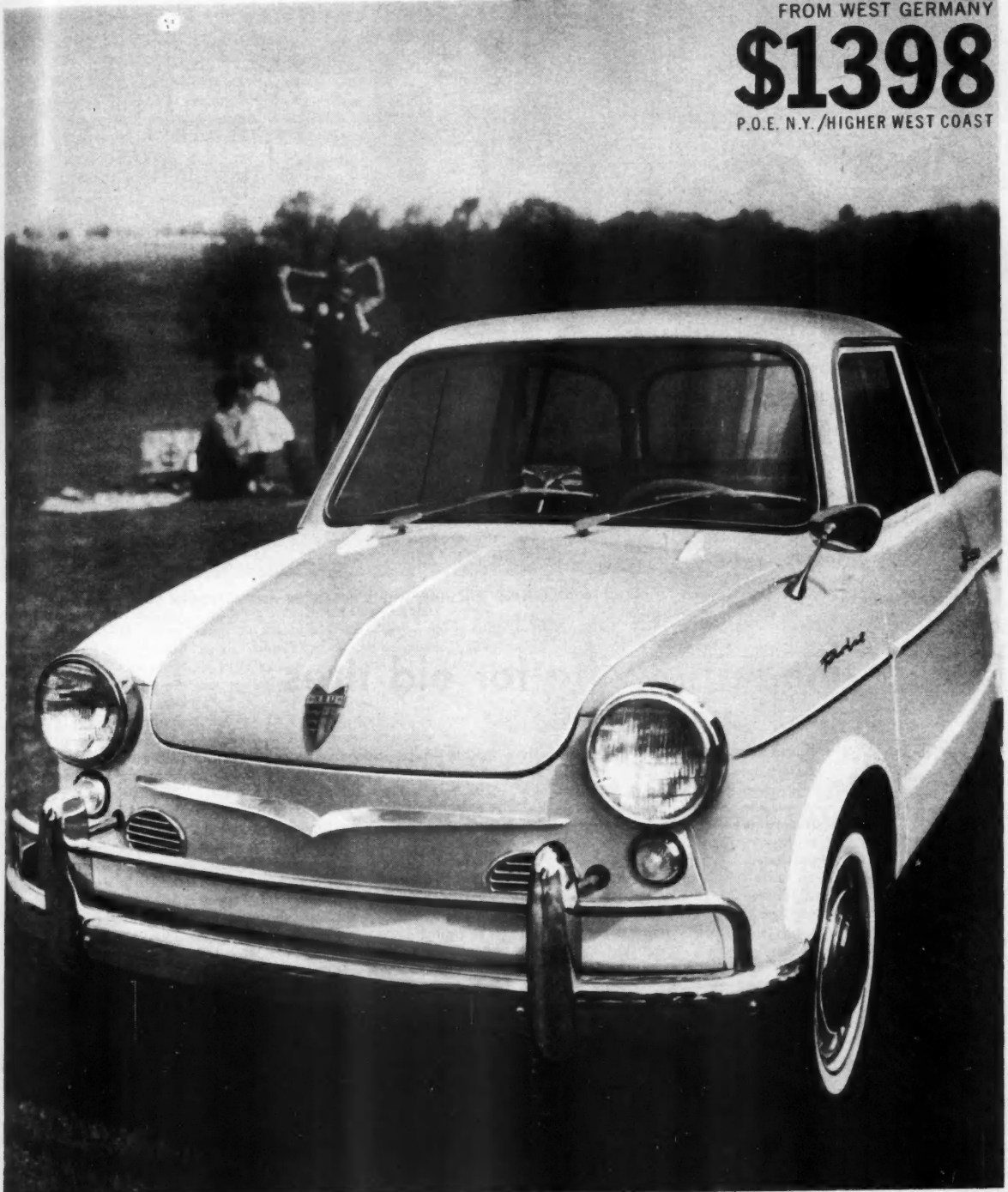
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# Use Tests OF NEW PRODUCTS



TIRE SERVICING AREA AT RIVERSIDE RACEWAYS INCLUDED MOUNTING MACHINE, WHEEL BALANCER AND NITROGEN TANKS FOR INFLATING.

## Recaps mean new life for old tires

**EVER NOTICE THE INTEREST** your friendly gasoline station operator shows in the "old" tires you trade in to him on a new set? If these "old" casings are good—i.e., recappable—they are of far greater value profit-wise than the new tires you just purchased.

Recapping is big business and a tire is of some use to someone as long as it can be capped. These casings run the gamut of their life from first class retreads to the cheapy caps for junkers on used car lots. Good recaps on good casings are a good investment but what constitutes a good job depends entirely on the skill, equipment, quality of materials and business tactics of the recapper.

Bruce Alexander, a recapper who gained an excellent reputation as the manufacturer of Bruce's Slicks, well known on the nation's dragstrips, has been working closely with the engineers of the Super Mold Corp., makers of Lodi molds and recapping equipment, and they have developed a tread pattern and method of bonding to produce a high quality cap for pleasure cars. Bruce's pet project, competition tires, has also been expanded and he has a new tread for stock car racing. Super Mold systems are located in major cities throughout the country and they can furnish the Turnpike 100 recaps on good quality tube or tubeless casings. The competition tire that Bruce calls Super Speed 120, is available only through him by mail order (ship carcasses to be capped), but a system of ordering is being set up through sportscars dealers who will handle the shipping.

It has been a long time since World War II tire shortages attracted a host of dollar-conscious recappers, but the memory of bubbles, thrown treads, and blowouts still lingers in the minds of many who became victims of anyone who claimed to be able to put rubber under their car. Reputable retreaders have been able to solve these

---

**MOTOR TREND'S testing staff endeavors to select products of interest to readers and to analyze them under conditions of actual use—just as any average consumer might like to test them before purchase. The purpose is to evaluate the product objectively in terms of the manufacturer's claims for it, and to pass on our test findings as a service to readers in trying to help them determine the merit of respective automotive items for their own particular use.**

**To qualify for a MOTOR TREND Use Test a manufacturer must first present his request for a test in writing to Testing Staff, MOTOR TREND, 5959 Hollywood Blvd., Los Angeles 28, Calif. In addition, before any item is accepted for testing, the manufacturer must sign a release agreeing to MOTOR TREND'S printing the complete, impartial test findings—whether the product be approved or disapproved. Only those products whose makers agree to these terms will be tested, and only those which are proved by actual use test to meet the manufacturer's advertised claims will be awarded the MOTOR TREND Seal-of Approval, which may be displayed in advertisements of that particular product.**








*Left: Tread depth gauge used to measure tire wear is calibrated in 32nds of an inch. Center: Overheating due to under-inflation at high speed can cause tube failure. Hole shows where tube contact with hot wheel rivet started blowout. Right: Part of screwdriver picked up during test runs did not blow out tire but worked into the tube and forced a pit stop for tire change.*

problems and furnish thousands of extra miles for a set of good casings. Just about everyone is interested in one main quality concerning tires and that is wear, but there are many other things to consider such as noise, tracking, traction, and the ability to stop—factors just as important as long-wearing qualities. There are others but most of them are concerned with the casing, and as our tests concerned the tread, we will concentrate on testing the recap.

MOTOR TREND's test car was a 1959 Plymouth Fury with Golden Commando engine, heavy-duty shocks, and 14-inch wheels. The test course . . . Riverside International Raceways—3⅓ miles with nine turns, six of them nearly 180 degrees and a mile-long straight, part of which is downhill. Problem . . . put as much wear on the tires as possible in the shortest time. The first driving schedule proved to be an ideal one for car, tires and drivers. We knew from past experience that the test car had handling characteristics and straightaway speeds that would enable MOTOR TREND's test drivers to lap consistently between 75 and 80 mph average and still provide a reasonable safety margin. The heavy-duty shocks can stand this strain on the corners and Plymouth's unsung but highly important piece of standard equipment—extra wide safety rims—keep tires on the wheels should trouble develop.

The driving pattern . . . one hour on each set of test tires at lap averages between 75 and 80 with a stop at 30 minutes to check pressures and wheels and lugs (we were not running safety hubs). At the end of the hour, stop to measure tread depth, check tire pressure and make timed "panic" stops from a free rolling 60 mph. Sounds simple but the tires really earned their keep, for at the end of the hour. tread wear was equivalent to nearly 10,000 miles of normal driving.

In addition to our findings on the product undergoing test, we made some interesting observations regarding tires that can be helpful to the motorist, so we will pass them along. One of these little items is tire pressure. We were running 28 lbs., or at least starting out with that pressure because it was about average for street use. Due to the speeds and fast cornering, tire pressure built up to 34 lbs. within the first 30 minutes. The heat of braking and tire friction in our 14-inch wheels was soon conducted to the rim area and near the end of the first hour—pow! a tube made contact with one of the hot rivets holding the rim to the wheel and the tube split. Lesson: run higher than street pressures (preferably 35 lbs.) for high-speed road travel. This lowers flexing friction, which reduces heat and pressure build-up.

All of the tests were conducted under as nearly similar conditions as possible, using new original equipment tires, mounted and balanced on the spot as a basis of comparison with the recaps on used but excellent original equipment casings. All casings, new and used, were nylon cord.

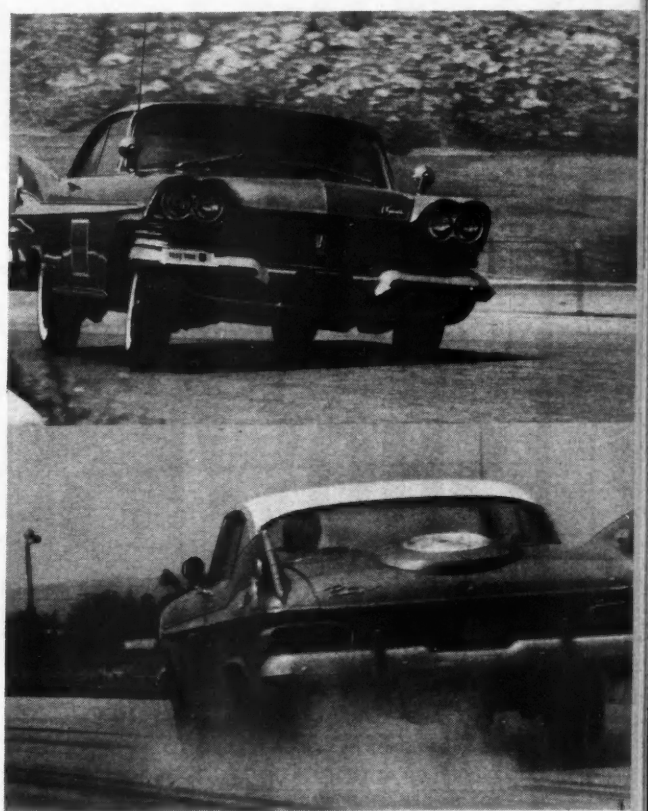
A word here about Super Mold's process. They have developed a tire centering system that insures even application of the Voit camelback and a truly round tire. During the vulcanizing process, the tire beads are pressed together, forcing the rubber into the molding die tread pattern, producing a tire that is the same shape as when inflated, with no flat or cupped surfaces that change shape when mounted.

Here is the way the wear test affected the measurable tread depth. All of the test tires, new and recapped, had a starting tread depth of $^{11}/_{32}$-inch. After one hour at high speed, wear average for all four original equipment tires was 6.75/32-inch. (Averages are given because the predominance of right hand turns caused high loading on the left side tires, especially the left front.) Wear on the Turnpike 100's under as near similar conditions as we could produce was 5.0/32nds.

Panic stops from free rolling 60 mph were 4.2 seconds for the stock tires, 3.8 seconds for the recaps. This is one of the worst things you can possibly do to a set of tires. One such panic stop can ruin a set of good tires if the friction heat burns the rubber, and can necessitate a truing job to take out the flat spot if it doesn't burn. On such a panic stop where the brakes are locked, the ability to come literally to a screeching halt depends not on brakes but on the adhesion of the rubber to the pavement.

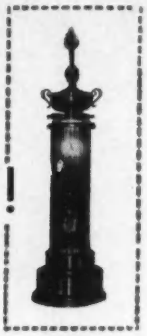
Time is distance and the quicker you can bring your car to a halt with all four wheels locked, the shorter the distance required. If you have had to rely on such a stop to avoid accident, have your tires checked by an expert and follow his recommendations.

**continued**



*Top: High-speed right-hand turn puts high load on left front tire, increasing wear. Bottom: Panic stops like this can ruin a good set of tires, but are an important part of tire testing.*

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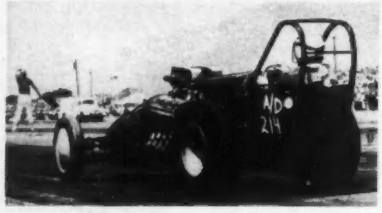
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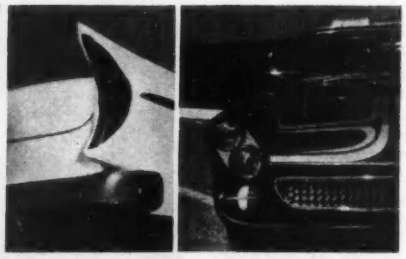


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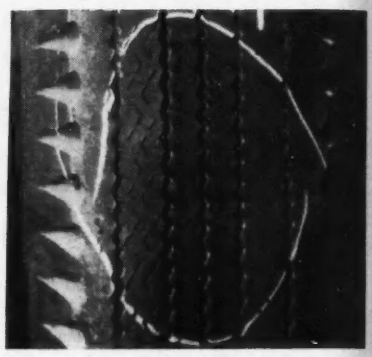
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TELEPHONE: NORMANDY 3-2158


Examination of the flat spots produced by our stopping tests revealed that the recaps showed no sign of scuffing or burning but would require truing to renew balance and roundness. The stock tires had about the same flattening but there was severe scuffing and burning. A tire in this condition can be trued but the injury to tread rubber is deep and future high-speed travel might cause trouble.

Foul weather driving tests early this year showed that the recaps provided better than average traction on packed snow, and good stopping and anti-skid qualities on wet pavement. Spinning the mounted tires and wheels on the car against a gauge to test the "roundness" showed that the recaps were just as true as the best original equipment tires.

Here are some of the ideas that Super Mold and Bruce Alexander have incorporated into the tread pattern. They work on the theory that rubber in contact with the ground produces the desirable traction qualities of a tire. The more air space in the tread due to grooves and free, poorly-supported blocks of rubber, reduce the rubber in contact with the surface and cause the unsupported sections of the tread to roll up like a noodle under acceleration or deceleration.



*Panic stops wore flat spots on recaps but did not burn rubber or tear tread pattern.*

MOTOR TREND also had an opportunity to test some of Bruce's own competition recaps. This tread pattern is designed strictly for "bite" in all directions with a very low rolling resistance. They have been used successfully for some time in stock car racing and Bruce's expanded program is aimed at better availability to sportscar competition. Hot lapping a 1600 Porsche on Riverside Raceways with a set of Super Speed 120's minimized the oversteer characteristics of this car as compared to the stock tires we have been using. Sticking qualities under severe side loading are excellent.

Super Mold's Turnpike 100 tires are available through recappers throughout the country that display the "Lodi" sign. For cities without these facilities, contact your local supply house as an increasing number of them can handle the shipping for you. For Bruce's competition Super Speed 120, you will have to deal direct with Bruce's Tires, 4017 MacArthur Blvd., Oakland 19, Calif. Prices vary according to tire size but for either street or competition, submit only casings in first-class condition, or Super Mold and Bruce will have nothing to do with them.

The Super Mold-Bruce-Voit combination of capping process, tread design and rubber compound deserves the MOTOR TREND Seal of Approval. /MT

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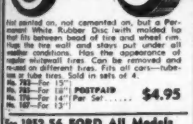
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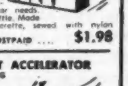



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New, exclusive "Torsional Adjustment"—height control—adjust wheel to your own requirements.

Adds approximately 1,000-lb. load-carrying capacity

Eliminates bottoming and rear end sag.

Easy to install—takes only minutes—no special tools needed.

Enjoy safe, smooth, straight driving with overloads when you add these new adjustable stabilizers. Can be installed or removed in minutes. Clamp to rear springs—no need to remove "U"-bolts or springs. Adjustable stabilizers not only increase load carrying capacity and restore car to original height, but they help to increase the life of tires, springs and shock absorbers. Give you better control of car, a more comfortable ride. Made of silicon-manganese spring steel. For the following cars, station wagons and light trucks:

| | | |
|---|---|---|
| 40-57 | Cadillac | 49-59 Mercury |
| 40-57 | Chevrolet | 51-59 Oldsmobile |
| 40-59 | Ford | 51-59 Pontiac |
| 48-59 | DeSoto | (with leaf springs) |
| 48-59 | Dodge | 40-59 Plymouth |
| 48-59 | Edsel | 40-57 Packard |
| 49-59 | Ford | 40-59 Studebaker |
| 49-59 | Lincoln | 53-57 Thirtd |

No. 320 Pair ..... $9.95

## LOWERING BLOCK KITS




With New Special Alloy Aluminum Blocks.

Lowers the rear end of car for better stability and cornering. Lowers center of gravity, prevents swaying—gives low sporty appearance. Easily installed—special "U" bolt extensions to attach to "U" bolts on car springs.

| | | |
|---|---|---|
| No. 873 | 2" Drop | $3.98 |
| Kit | | |
| No. 874 | 3" Drop | $5.75 |
| Kit | | |

WILL FIT FOLLOWING

Cadillac—58-57 Chrysler—53-57 DeSoto—53-57 Dodge—55-57 Packard—51-54 Plymouth—55-57 Studebaker—57 and all other cars and trucks with 2½" wide springs.

No. 875—For 2" Drop Kit ..... $4.95

## CRUISING THROTTLE

Adjusts To Any Speed. Disengages Automatically.

A throttle control that relieves driving fatigue and relaxes leg cramp. Preset rate of speed with handy dash control. Use accelerator for increasing speed—take foot off of accelerator and car resumes preset speed. Disengages automatically when brake pedal is touched. Handy for idling cold motors. Easy custom installation. Fits the following cars: All '54 Buick, Cadillac, Chevrolet, Chrysler, DeSoto, Dodge, Ford, Mercury, Oldsmobile, Pontiac, Packard 6 Cyl. Chrysler, DeSoto, Dodge, & Plymouth. Furnished in 6 and 12 volt.

State 6 or 12 Volt
No. 335—Each ..... $4.95

## The Light Detroit Forgot! Gear Shift Selector LIGHT For 1959 Chevrolet



- Illuminates the selector barrel dial.
- Chrome plated to enhance the beauty of the car.
- Can be installed in minutes—no holes to drill—only one screw to remove and replace.
- A simple answer to one of the most dangerous and irritating problems on the 1959 Chevrolet.

No. 307 Postpaid ..... $2.00

## CONVERTIBLE RAINCOAT

Quick, Slip-On Protection In Any Kind Of Weather For Convertibles



Attractive plastic cover protects top or interior from dirt, dust, fog, rain, snow and other elements. Saves all wear and tear on expensive fabric tops. Quick, sure, easy, inexpensive protection with one-minute installation. Built to last, with elastic tight-grip edge, and snaps. Fits all standard model convertibles. Can be used when top is up or down. Also handy as a cover for play pens, small boats, furniture, baby carriages and many other items. Furnished in plastic bag for storage.

No. 574—Each ..... $5.95

## AUTOMATIC TRUNK LIGHT




Completely automatic operation. Equipped with Minuteman Mercury Switch. Simple installation. Light goes on when trunk lid is opened. Fits any car—all necessary wire included. Completely self-anchored unit.

No. 161—POSTPAID, Each ..... $1.59

## Chrome Door Lock Knobs

TRIPLE CHROME PLATED

Changes colored door lock knobs to all chrome. Customizes interior of car and brightens inside of doors.

Specify Car & Year.
No. 575—
POSTPAID ..... 2 pcs $1.00

## Thunderbird Type AIRSCOOP



GIVES ANY CAR THAT SPORTS CAR LOOK

Long tapering Thunderbird type air scoop lends sporty finishing touch to giving the car a sporty look. 23" long and 13" wide at the front tapering to 6" wide at the back. Stainless steel front plate with the rest of the scoop in prime finish so that it can be finished to match the car. Furnished complete with rubber gasket and sheet metal screws for easy mounting. Can also be welded or fibre glass mounted.

No. 839 —For all cars ..... $7.50

## REPAIR and RESTYLE with Fiberglass CUSTOMIZING Kit



- Repair dents & holes.
- Make Cadillac Fins
- Make frenched headlights
- Air Scoops
- Duplicate Continental Spare Tire Mount
- Build Hood Teats.

Do-It-Yourself Kit Full instruction book included with each kit. No loading, no waiting. Easy to use special tools needed. Fiberglass is acid-proof, waterproof, and rust-proof. Will not rust, rot or deteriorate. Will not dent. Easily repaired if damaged. Blends perfectly with metal as it doesn't shrink. Available in woven fabric cloth, crushed frac. or fine bonded "mat".

FIX-IT KIT —Covers 2 square Feet. For car repairs, decking—plus customizing. Also useful on home for repairing gutters, water tanks, etc. Includes 3 Sq. Ft. cloth, ½ qt. Resin Epoxy, 1½ oz. hardener, 1 pair of Gloves.

No. 19—POSTPAID, Each ..... $3.78

## TU-TONE MUFFLERS




Custom Engineered. Custom Fit.

Cut-outs are absolutely the finest sound valve FOR MOST ALL CARS INCLUDING FOREIGN & SPORTS CARS WITH OR WITHOUT DUALS. Straight thru exhaust advantages or conventional mufflering with a flick of the sound control valve. Conventional stock muffler sound to a high pitched staccato crescendo at the touch of your fingers. Tu-Tone Mufflers give you:

- Up to 25% more horsepower.
- 2 to 3 miles more per gal.
- INCREASED ENGINE LIFE.
- Increased engine operating efficiency
- Reduces carbon formation.

Specify make of car, year and model when ordering. No. 630—Postpaid Each ..... $14.95

## T-BIRD TYPE EMBLEM



Modern designed metal emblem, consisting of symbolical Thunderbird design in glistening chrome with red and white enamel trim. Size: 4½" x 2¼". Easy to mount—self-adhesive, no holes to drill. Just strip off backing and apply. Stays permanently on any clean smooth surface. Can be placed anywhere, on door, fender, body, fenders, skirts, continental kit, etc.

No. 897 Postpaid ..... $1.00

## Impala Type Flag Emblem



A new, beautiful and modern emblem, consisting of two crossed flags and eagle in flowing motion. Detailed in brilliant colors and trimmed in gleaming chrome. Checkered Flag is white and black, other flag is a bright red. Size: 4½"x2". Easy to mount—self-adhesive, no holes to drill.

No. 441—POSTPAID. Each only ..... $1.00

## NEW 1953-54 CHEVROLET BELAIR BLOOMERS



for 53-54 Belair CHEVROLET and Model 210 with factory equipped fender skirts. CHROME PLATED

CHROME PLATED—Rich looking. Fits on bottom of fender skirt and completes the lower body line.

- LONGER—Lengthen appearance of car.
- LOWER—Car looks low and sleek.
- NATURAL—Completion of styling.

No. 572—
Per pair ..... $12.50

## TRUNK DRAIN KIT for 1959 CHEVROLET



Eliminates Water Leaking Into Trunk.

Due to its design, the forward angle of the 1959 Chevrolet trunk drain permits water to overflow into the trunk area. By installing this trunk drain kit properly, water leakage into the '59 Chevrolet is eliminated. Kit consists of two brass drain fittings, washers, nuts, and sufficient rubber tubing to completely service one car. Easy to install.

No. 111 —Per Kit ..... $3.00

## Cattle Caller Horn

Moos Like A Cow! BELLOWS LIKE A BULL!



A new sound-ation in auto horns. Control mounted on steering column permits variation of tone from the low moo of a cow to a full bellow of a bull. Ideal for use by cattle owners and those who want a different sounding horn. Easily mounted—complete with switch. For either 6 volt or 12 volt systems.

No. 628—6 Volt Each ..... $12.56
No. 629—12 Volt Each ..... 14.39

## Oil Drain Reactor Plug



Destroys engine acids! Stops engine suicide! Reactor plug replaces oil drain plug. Magnet draws all metallic abrasives from engine oil ensuring longer engine life. Use for all makes of cars.

No. 300 POSTPAID 2.45 ea.

## LOWERING KIT FOR 58-59, CHEVROLET




Adjustable 2" to 4" drop. Lowers center of gravity. Gives car that ultra-low-custom look. Complete kit with specially designed bracket. Special steel formed to fit 1958 Chev. rear coil spring. Includes 4 special bolts & nuts. Easy to install—no alterations to frame necessary.

No. 836 —Kit ..... $5.35

## AUTO FABRIC SPRAY

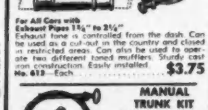



For a new looking car interior. Brightens and freshens faded and soiled fabrics. Ideal for upholstered cars for use on headliner, door panelling and floor coverings. Will not rub or fade. Use to tu-tone upholstery. Choice of red, rust, brown, tan, dark and light green, dark and light blue, dark and light gray, yellow, maroon, rose or black.

Specify color when ordering.

No. 26—
POSTPAID ..... $2.95

## CAST IRON EXHAUST CUT-OUT

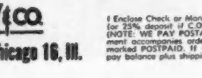


For All Cars with Exhaust Pipes 1¾" to 2½"

Exhaust tone is controlled from the dash. Can be used as a cut-out in the country & closed in restricted areas. Or may be used to operate two different tuned mufflers. Well constructed of heavy plate steel. Strengthens the exhaust pipe.

No. 613—Each ..... $3.75

## MANUAL TRUNK KIT

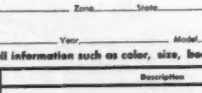


Streamlines rear deck lid. Removes recessed handle, operate from inside of car. Complete with instructions and diagrams. Easy to install.

No. 286—Fits Ford 36-55, Merc. 39-55, Chev. Buick, Olds., 49-55. All G.M. Cars 49-53. State Buick, Olds., 49-55. All G.M. Cars 49-53. State Year, Make and Model.

POSTPAID ..... $1.49

## WHEN YOU WANT PLENTY OF NOISE—INSTALL A HOLLYWOOD NOISE MAKER MUFFLER



For all makes of Cars.

THE MUFFLER WITH THE LOUDEST R-O-A-R!

- All Steel Construction with electrically welded seams.
- Shell length only 11 inches long.
- Overall length 14". Diameter 5".
- Straight-thru construction with perforated inner core. No Packing—No Baffles.
- Universal end caps with bushings make this muffler adaptable to any size tailpipe.
- Complete with clamps and bolts

No. 841—Each ..... $3.98

## NEW SHOCK OVERLOAD SPRINGS



Installs Over Present Good Shock Absorbers.

Shock springs carry heavier overloads with a level ride—no bottoming.

UP TO 2000 LBS. ADDITIONAL LOAD CARRYING CAPACITY.

Easy to install—anyone can install in minutes. No special tools required. Slips right over present shock absorbers. No more sag and drag. No car bottoming. Fits almost all makes & models. Increase road clearance.

Fits most rear coil spring type shock absorbers. Specify make, year and model of car when ordering.

No. 532—Per Pair ..... $6.95

## THUNDERBIRD TOP HOIST



- Makes a one-man job of removing the Thunderbird top.
- Solves the problem of storage.
- Attaches to any overhead support in garage or carport.

A fully adjustable sling (it 1000 lb. test webbing, eliminates any damage to the top or car. Special ratio pulleys making lifting weight of top light enough for a child to handle. All necessary pulleys, attaching hardware and 450 lb. test rope furnished with complete operating instructions.

No. 83
Each ..... $9.95

## STOP BURNING OIL With This $7.00 Value Famous ENGINE OVERHAUL KIT



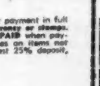

Rebuild your motor while you drive. Save on Repairs. Get new car power. Money back guarantee.

Do-it-yourself in 10 minutes! Save on repairs! Simply drop Pellets in valve or plug openings. Pour Liquid Plate in oil. This potent compound rebuilds your motor while you drive. Good for 10,000 miles. Sealed.

POSTPAID ..... $4.95

No. 125—$7.00 Value BOTH FOR

## NEW EXHAUST CUT-OUT



Exhaust tone is controlled from the dash. Can be used as a cut out in the country & closed in restricted areas. Or may be used to operate two different tuned mufflers. Well constructed of heavy plate steel. Strengthens the exhaust pipe.

No. 86—For All Exhaust Pipes through 2" diameter

No. 816—For All Exhaust Pipes 2½" thru 2½" diam.

POSTPAID EACH ..... $2.89

## BURGLAR ALARM



Completely Automatic —Goes Into Action if the Car is Molested.

No. 17—
POSTPAID ..... $2.95

## NEW! CUSTOM STYLED CRUISER FENDER SKIRTS For ALL CARS



- New design that blends into fender line—gives the car a longer, continuous flowing look.
- Covers the wheel well for that sleek, streamlined appearance — makes it look longer and lower.
- Positive locking device — prevents rattle, can't shake or fall off.
- Easy to install.
- 44" long—covers the flare and beading of the fender.
- Made of heavy gauge steel—prime coated —ready for finish coat

| Year | Make & Model | Year | Make & Model |
|---|---|---|---|
| BUICK | | CHRYSLER | |
| 50-53 | 2-Door only | 57-59 | All Models |
| 1955 | All Models | DE SOTO | |
| CADILLAC | | 49-54 | All Models |
| 55-58 | 2-Door only | 57-59 | All Models |
| CHEVROLET | | DODGE | |
| 49-52 | 2-Door only | 41-54 | All Models |
| 53-54 | All Models | 56-59 | All Models |
| 1955 | 2-Door only | EDSEL | |
| 1956 | All Models | 58-59 | 2-Door only |
| 1957 | 2-Door only | 59-61 | All Models |
| 1959 | 2-Door only | | |

| Year | Make & Model | Year | Make & Model |
|---|---|---|---|
| FORD | | PLYMOUTH | |
| 55-59 | 2-Door only | 41-52 | All Models |
| HUDSON | | 53-54 | 2-Door only |
| 1953 | All Models | 55-59 | All Models |
| MERCURY | | PONTIAC | |
| 49-51 | All Models | 49-52 | 2-Door only |
| 52-59 | All Models | 53-54 | All Models |
| OLDSMOBILE | | 55-56 | 2-Door only |
| 1952 | 2-Door only | 57-59 | All Models |
| 53-54 | 2-Door only | 1958 | 2-Door only |
| 56-57 | 2-Door only | WILLYS | |
| 1959 | All Models | 53-54 | All Models |
| | | No. 330 | |
| | | Per Pair | $16.95 |

## STYLE LEADER CONTINENTAL KITS



Styled to compliment and blend with the contour of the car. This kit is constructed for durability and trouble free operation. Special design locking device holds kit in rigid position, eliminating any forward or backward motion. Kit holds back allowing easy access to trunk. Carrier is well balanced for easy swing back. Comes complete with Four Posts, Tire Ring, Gravel Guard, Instruction Sheets and all necessary fittings for easy installation. All parts are prime finished. Choice of Frame or Stainless Steel Ring.

When ordering—Specify (1). Kit (Including Tire Ring), (2). Faco Plate Desired. Specify year, make, model and tire size.

| Year | Make & Model | With Prime With Stainless Tire Ring | Steel Tire Ring |
|---|---|---|---|
| 49-58 | Chev. (All Exc. 58 Corvette) | Stk. No. 334 | Stk. No. 335 |
| 49-58 | Ford (All Exc. 58 Skyliner) | | |
| 53-58 | Mercury, All Models | | |
| 53-58 | Oldsmobile, All Models | | |
| 56-58 | Studebaker, Hawk Series | Each | Each |
| 1957 | Thunderbird | $49.95 | $58.95 |

## PIN STRIPING

The Newest and Latest Custom Design Choice of White, Gold, Black, or Red

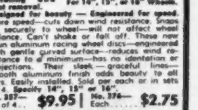


Ready made original design striping, easily applied in minutes. Gives that custom look, clean, dry surface. Will not chip, peel or fade. Kit contains fifteen decals in nine different designs up to 61".

Will stripe an entire car; fenders, trunk lid, hood, skirts and other parts. Specify color when ordering. White, Gold, Black, Red.

No. 338—POSTPAID, Per Kit ..... $1.00

## Spun Aluminum SNAP-ON RACING WHEEL DISCS



For 14", 15", or 16" Wheels.

NOTE — the SNAP-ON Feature. Can't damage the wheel security or rust. Can't cause wheel to wobble and wheel remains true.

Designed for beauty — Engineered for speed. More speed—cuts down wind resistance. Snaps on securely to wheel—will not affect wheel balance. Can't cause wheel to wobble. These spun aluminum racing wheel discs—engineered with gentle curved surface—reduces wind resistance to a minimum—has no identation or projections. Their sleek — graceful lines smooth aluminum finish adds beauty to all cars. Easily installed. Sold per each or in sets of 4. Specify 14", 15" or 16".

No. 357— Each ..... $9.95 | No. 376— Each ..... $2.75
Set of 4 | Set of 4

## MELLOW TONE Fiber Glass Packed MUFFLERS

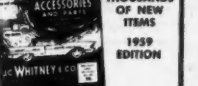


Custom designed and engineered to fit each make and model of car—no alterations necessary.

Increases horsepower, increases gas mileage, straight-thru construction, no back pressure, no high pitch irritating noises, adds powerful non-offensive tones. Be sure to Specify Make of Car, Exact Year of Model, Type of Transmission, Single or Dual Exhaust.

Stk. No. 37—Each ..... $4.95

## AH-OOO-GAH Chromed HORN

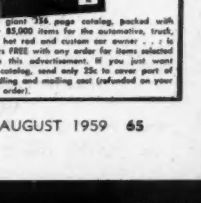


Here it is for the sport car enthusiast. Not a vibrator or other substitute but a genuine made-over horn. Stake 6 or 12 VOLT.

No. 60—POSTPAID. $12.60

## FREE!

NEW 356 PAGE CATALOG— BIGGEST IN OUR HISTORY!




NEW LOW PRICES! THOUSANDS OF NEW ITEMS 1959 EDITION

This giant 356 page catalog, packed with over 85,000 items for the automotive, truck, car, hot rod and custom car owner . . . is yours FREE with any order for items selected from this advertisement. If you just want the catalog, send only 25c to cover part of handling and mailing cost (refunded on your first order).

## USE THIS HANDY ORDER FORM — MAIL TODAY!

JC WHITNEY & CO.
1917 (028) Archer Ave., Chicago 16, Ill.

Name_____

Address_____

City_____ Zone_____ State_____

STATE—My car is a_____ Year_____ Model_____ No. of Cyl_____

NOTE! Please be sure to give all information such as color, size, body style, make, year & model.

| | Quantity | Stock No. | Description | Price |
|---|---|---|---|---|
| Ship following order on a Money Back Guarantee of Satisfaction | | | | |

( Enclose Check or Money Order $_____ to cover payment in full (or 25% deposit if C.O.D.) Please do not send currency or stamps. (NOTE: WE PAY POSTAGE on items marked POSTPAID when payment accompanies order. You pay shipping charges on items not marked POSTPAID. If C.O.D. order, enclose at least 25% deposit, pay balance plus shipping charges upon delivery.)

☐ Catalog sent Free with your order. Check here if you want Catalog only—Send 25c.

JC WHITNEY & CO. 1917 Archer Ave., Chicago 16, Ill. 028 MAIL HANDY ORDER

World's Finest Tire!
MICHELIN "X"

FOR FAST CARS



FOREIGN AND DOMESTIC

- DOUBLE TIRE MILEAGE
- HOLDS ON ANY SURFACE
- SAFE AT 130 M.P.H.!
- ELIMINATES TIRE SQUEAL

COMPLETE STOCK FOR ALL CARS AND TRUCKS

*DEALER INQUIRIES INVITED*

HAL MOODY'S
TIRE SERVICE
4650 San Fernando Road, Glendale, California

NOW!
CANY
PROJECTED NOSE
Fits all late model G.M. cars—$1.10 ea.

TESTED AND APPROVED MOTOR TREND



LODGE
WORLD'S FINEST SPARK PLUG

Dealer and Jobber Inquiries Invited
401 East Washington Blvd., Los Angeles 15, Calif.

The Mechanic's Best Friend!

Works in seconds!




Loosens Rusted Bolts
nuts, screws, "frozen" parts!
LIQUID WRENCH
SUPER-PENETRANT

The super-penetrating rust solvent that quickly loosens rust and corrosion.
AT ALL HARDWARE AND AUTO STORES
RADIATOR SPECIALTY COMPANY
CHARLOTTE, NORTH CAROLINA

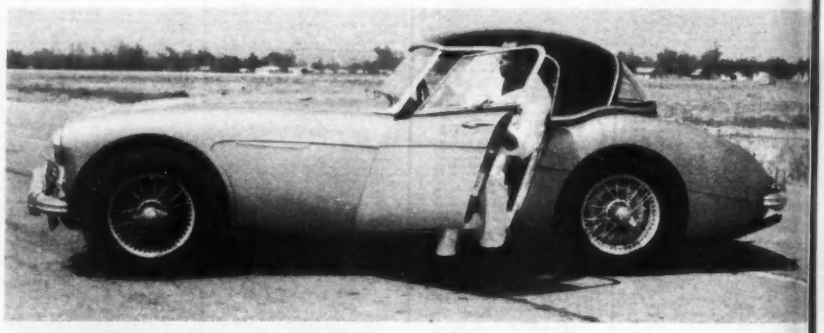
Also available in Pint, Quart and Gal. cans

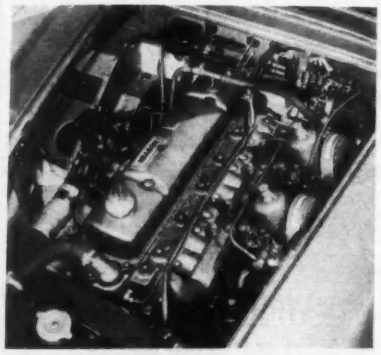
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AIR CONDITIONING UNITS
And for Other Foreign Cars
Give Make, Model and Year of Your Car
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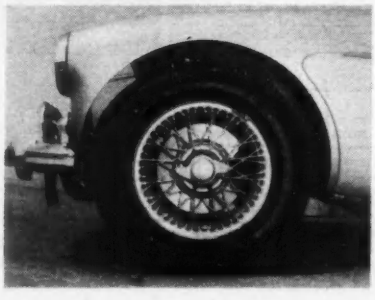


# Bigger Brother for Austin-Healey

*New 130-hp model boasts 3-liter engine, front disc brakes, optional hard top*







*Hard top gives new 3-liter Healey a brutish look, but it still keeps refined profile. Entry, however, requires some squirming. All changes to engine are internal—bore has been increased to 3.28 in. Girling 11¼-in. discs at front brake extra speed.*

*by Len Griffing*

**SINCE ITS INCEPTION** the Austin-Healey—first the 100-4, later the 100-6—has held a comfortable niche between the bigger Jaguar and the smaller MG. Its popularity is easy to understand. Its body lines are handsome, and the engine—even in absolutely factory tune—develops enough suds to get off briskly from a stoplight with stockers from Detroit. Handling, though not flashing in true stock condition, is fair, and very responsive to minor modification. All the elements are there, including a Panhard rod at the rear and a stabilizer bar at the front.

But, of course, times change. The Plymouth Fury and the Pontiac Bonneville not only dragged away from stock 100-6'ers, but did it ignominiously. It was no contest. Something had to be done.

Fast the in-line six might not have been, but durable and sturdy it most assuredly was. The hundred-plus-a-few horses extracted from its 2639cc did not represent fabulous output, so why not take out a few more? But how to go about it?

To begin, the stroke/bore ratio was 1.12:1 (3.50 in. x 3.125 in.). There seemed to be only one way to go. Besides, the modern trend is toward shorter strokes—shorter, that is, in relation to the bore. The cylinder was opened up to 3.282 in., giving a new stroke/bore ratio of 1.064:1.

The result is a new displacement of 2912cc (171.7 cu. in.), and a new power rating of 130 hp, peaking at 4750 rpm. Compression ratio is now 9.03 to 1.

To accommodate the new power, higher rear end gears are fitted, which give higher mph at equal rpm. Without the Laycock de Normanville overdrive unit, standard gearing is 3.55, producing 20.9 mph/1000 in top gear. If ordered with overdrive, a lower 3.91 gearing is standard. Coupled with the .822:1 speed step-up, overdrive top produces 23.1 mph/1000 rpm. This is a net reduction of 10.6 per cent over the smaller-engined car. Transmission ratios also have been altered in the new model.

Because of the added displacement, the torque factor is substantial. It's no problem to pull a hill at 1000 rpm in fourth overdrive. And the engine really doesn't appear to be working, even though we certainly don't recommend this kind of lugging.

**ACCELERATION**

| | |
|---|---|
| 0-45 | 7.0 secs. |
| 0-60 | 12.6 |
| ¼-mile | 18.8 & 75 mph |

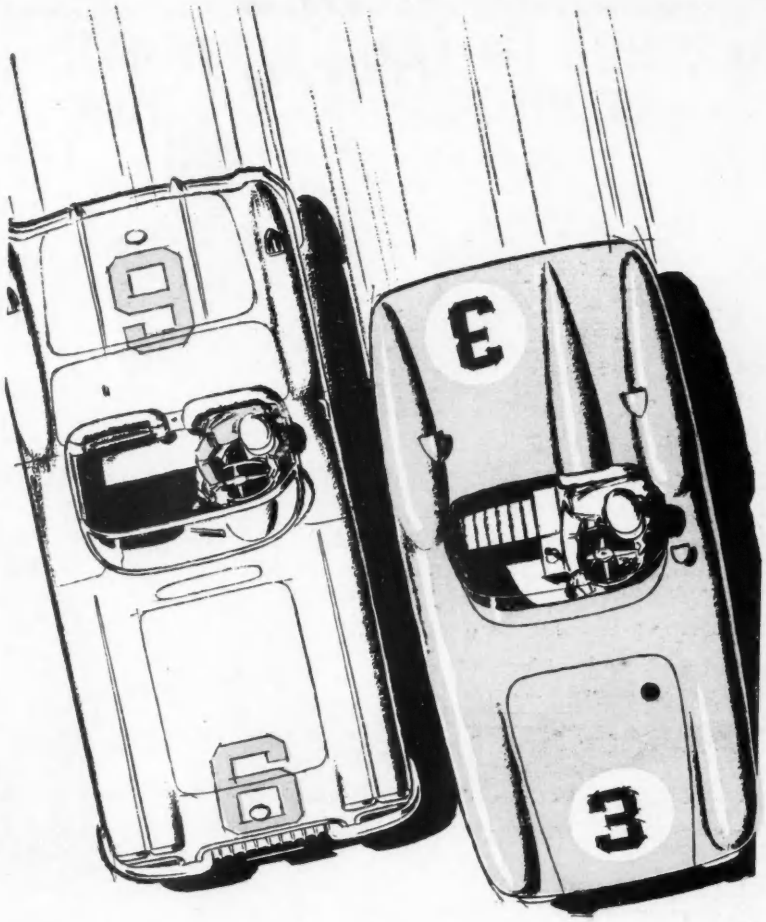
**PASSING SPEEDS**

| | |
|---|---|
| 30-50 | 6.4 |
| 45-60 | 5.5 |
| 50-80 | 13.4 |

As a companion to the bigger engine, a 10-inch clutch replaces the nine-inch disc, and 11¼-inch disc brakes are fitted to the front wheels (which do most of the stopping), while 11-inch x 2½-inch drums are retained at the rear. As to stopping power, well, you just can't fade a disc brake. Fade is caused by friction heat expanding the friction-producing components away from each other. A disc brake expands the friction pads into the disc; the hotter they get the better they work.

In the appearance department, a new glass-reinforced resin roof is available. This roof is identical to the roofs installed on the cars at Sebring (a touring car must have a roof), except that the finish and the appointments are lush. It stands as an example of what can be done if someone puts his mind to making a luxury accessory for a luxury car. Roof interior is finished in a leather-like perforated material, padded at the front end for safety and appointment value. It looks good, though on the pilot models fit was a bit vague around the edges.

Test car was equipped with Dunlop R-4 tires, an excellent choice. Weight, with full tank of gasoline, was 2580 lbs. Suspension seemed a bit soft, but it was a road machine. Besides, anybody knows how little you have to do to make a street Austin-Healey handle like a race car.


**When competition gets hot ...so do gears**

To prevent gear failure caused by the heat and stresses of racing, the D-A Lubricant Company has created D-A Speed-Sport Gear Lube, engineered specifically to protect transmissions and rear end center sections used in competition.

D-A Speed-Sport Gear Lube offers these advantages: prevents metal scoring, protects differential pinions from extreme heat and pressures, will not foam, prohibits gear failures caused by inadequate film strength and eliminates drag caused by oil thickening, even under conditions of great heat.

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Developed and proven in racing, D-A Speed-Sport Gear Lube offers an extra margin of safety for the judicious highway or city driver.

Specify D-A Speed-Sport Gear Lube, by the creators of D-A Speed-Sport Oil, the oil engineered for the motorist who knows about—and cares about—his car.



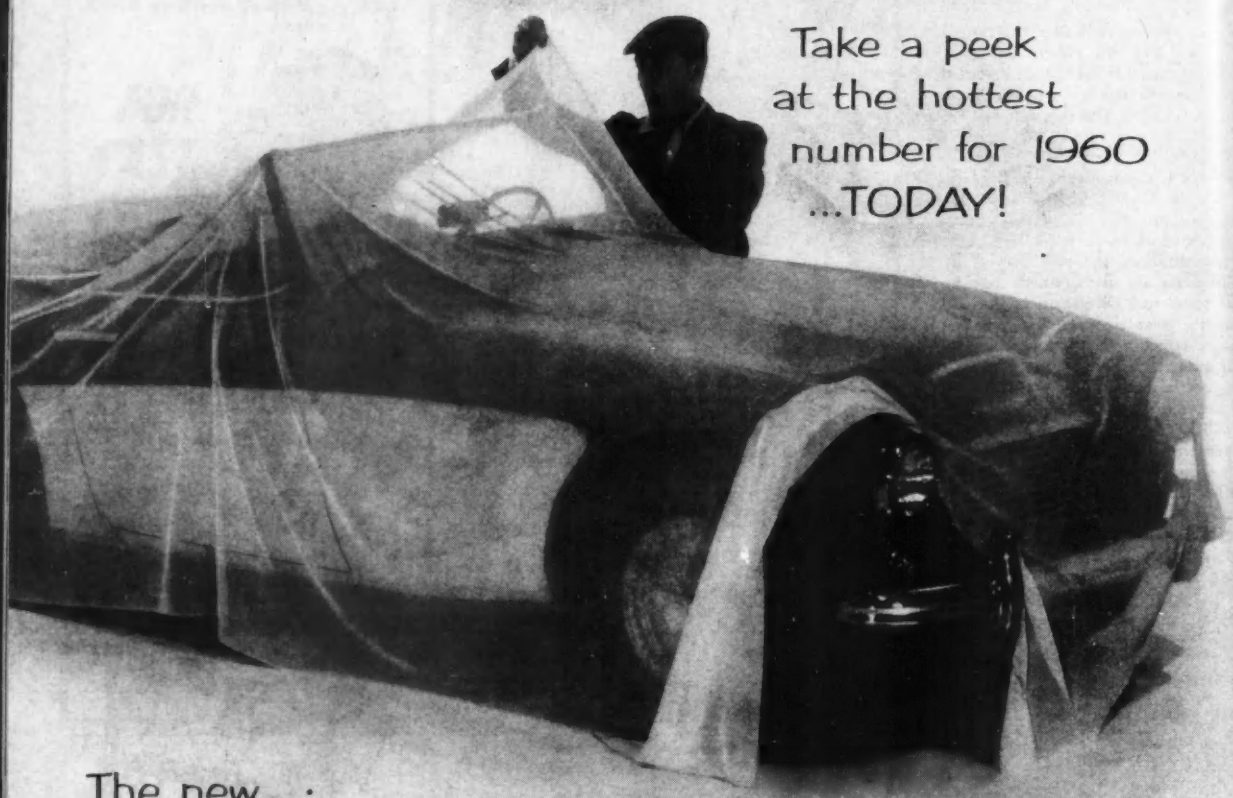

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# Electric Cars

continued from page 29

certain percentage of its current. When this "field-shunting" takes place, the same motor becomes a new motor—electrically, that is—and its torque curve rises rapidly, providing power and speed for whatever application the designer chooses to incorporate into its specifications.

**MECHANICAL DRIVE-TRAIN** The transmission of power from traction motor to wheel has many solutions. Motors are already available from ¼ hp at 12 volts to 15 hp at 96 volts, in protected or totally enclosed designs, standard foot-mounted or flange-mounted types, for horizontal or vertical shaft positions. Armature bearings can be furnished for high thrust and gear reaction loads, and integrally mounted gear reducers are available.

Once the maximum desired speed and top motor armature rpm are set, the overall transmission ratio is known. By using two motors, each driving one wheel independently, there is no need for a differential. The slight difference in motor rpm around curves or corners would have no adverse effects on motors or circuit components. By using direct electrical reversing, no reverse gearing is needed. Chassis mounted motors reduce unsprung weight.

Here are some of the drive-train possibilities, in the order of their efficiency and utility:

1) Motors with integral spur-geared speed reducers, each armature shaft parallel to and driving a VW-type swing axle.

2) Motors with horizontal shafts 90 degrees to solid rear end housing, each driving a separate bevel pinion-and-ring gear located near each wheel hub.

3) Motors with shafts parallel to regular differential axle, operating into both sides of a 1 to 1 or slightly higher ratio right-angle gearbox. The gearbox output shaft couples to differential pinion shaft with a driveshaft long enough for universal joint action . . .

**OTHER VEHICLE COMPONENTS** BRAKES: While it is possible and practical to use dynamic or regenerative braking on electric vehicles, much development work lies just ahead for the basic control devices and power circuits. Therefore, these two forms of braking, which make generators out of the motors, may not enter the picture for some time. Dynamic braking absorbs the retarding energy in heavy resistors; regenerative braking returns the energy to the battery at the maximum allowable charging rate. Regular hydraulic drum brakes or other types of friction brakes are used, generously proportioned to take care of the added energy of the rotating motor armatures.

LIGHTS: A supply of electricity for headlights, small bulbs, or anything else that cannot use the full motive-power battery voltage, presents a small problem. Storage batteries definitely should not be tapped between cells for even a small amount of current. To do so will invariably affect the plates and voltage balance of cells so tapped.

Therefore, a small motor-generator set, a small generator charging a separate six- or 12-volt battery and driven by the drive-train,

continued on page 70


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T-8

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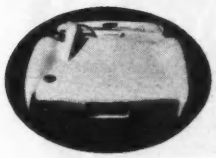
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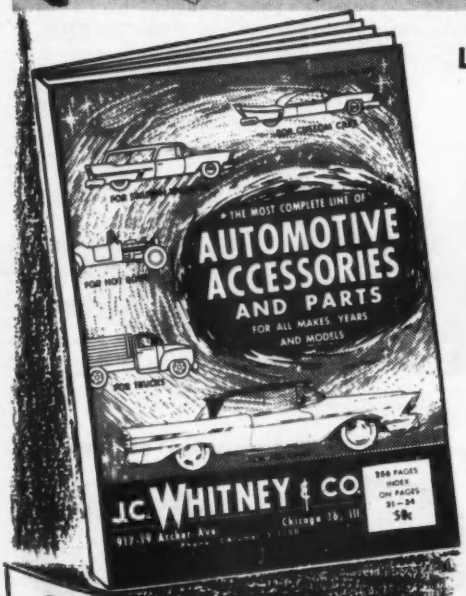
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# Electric Cars

**continued**

or a voltage dropping resistor for each individual light and device, should be used. A battery-tapping circuit, for emergency use only, might be provided.

POWER ASSISTS AND RADIOS: These can easily be designed for any battery voltage, and include electric windshield wipers, seat movers, power steering pumps, etc. Car heaters would have to use butane or liquid fuel for the source of heat, because electric heaters would be out of the question here.

**AUXILIARY POWER SOURCES** The concept of using a compact, high-performance engine, driving a generator for constant battery charging might sound silly at first, until you look into the *average* power requirements for an automobile. Unless you are driving up one Pikes Peak after another, the only time you are using the full horsepower built into your engine is during rubber-burning starts and accelerations, or when passing cars.

So now this new idea begins to make sense—use the natural torque conversion of series-wound motors, powered by radically new storage batteries for peak performance periods, then let a constant load-constant rpm-constant compression ratio engine recharge this battery when the car is up to speed, slowing down, or standing at a red light.

It is logical to believe that the engine would have an idling device, controlled by the generator voltage regulator, which would act whenever the battery came up to full-charge voltage. At other times, the engine rpm would be controlled by a governor.

Engine cranking could be done by using the generator temporarily as a motor, powered by the large battery. On the other hand, a choice of a six- or 12-volt system for lights would require a standard car generator and battery. A small standard starter would save special cranking controls and at least one contactor.

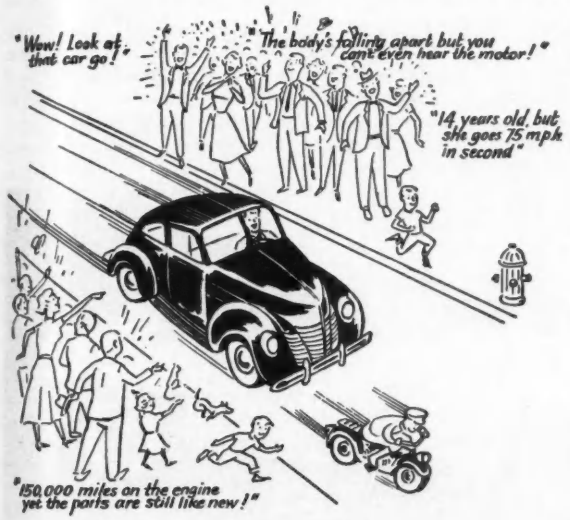
Heating this car will be a breeze! Chances are 10 to 1 it will use an air-cooled engine, and even 35 hp can heat a good-sized vehicle, à la VW system. For very cold climes, the Steely exhaust heat recovery unit, fabricated from stainless steel tubes, plates and rods, can add 50 to 100 per cent to the car-heating capacity from an air-cooled engine.

**GENERAL VEHICLE DESIGN** Freedom from mechanically connected units in an automobile has been the Midsummer Night's Dream of every vehicle stylist and design engineer. Here it is, to the greatest possible extent, even in the AM-Sonotone idea—an air-cooled engine with integral generator (no radiator), a battery divisible into four or more locations (even vertically stacked), and traction motors with several varieties of drive-train.

All this connected by flexible electric cables and wires! The various controls and contactors can be located in otherwise unused space, preferably in a group to simplify wiring, but they must be installed in an accessible place for proper maintenance and inspection.

This discussion of the possibilities ahead for electric cars is based on firmly established electrical and mechanical principles, and the development of electric traction in the automotive field should be quite interesting to watch. /MT

# Here's How a $4.95 Magna-Power Saves You up to $200...or your Money Back!




## Does YOUR car give you the pep and power it had when new?

— if not you need a Magna-Power! With a Magna-Power you can save 80% of your engine repair bills and have a "new" car longer.

— it takes only one minute to install — at a cost of less than .005¢ per mile (five/thousandths of a cent!).

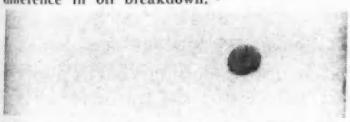
— a $4.95 investment in a Magna-Power will return itself IN FULL every time you change your oil — and keep on doing so for years, saving you hundreds of dollars in formerly unnecessary oil changes, engine repairs, etc.

As one Magna-Power fan wrote: "There is no excuse whatever for a man to change oil every 2000 miles if he knows there is such a thing as a Magna-Power antacid neutralizing drain plug." And, of course, that fan's 13-year-old Chevy is his pride and joy — and is never in the repair shop — except for minor tune-ups, lube jobs, etc., then presto! On one oil change the entire $4.95 saved — and his engine protected against acid corrosion — runs like a clock — quiet as a watch — "powerful as a B52" — a car with an engine that will not let you down — that actually increases in power, pep, speed and performance the older it gets. More automotive engineers, oil chemists and mechanical engineers have installed Magna-Powers on their engines than any other proportionate group of our population. And thousands of Magna-Powers have been bought by critical people in the past 9 years — people who save hundreds of thousands yearly — and more important, get for themselves increased trade-in allowances amounting to hundreds of dollars for turning in mechanically perfect cars.

## HERE'S WHAT'S IN IT FOR YOU

### 1. OIL

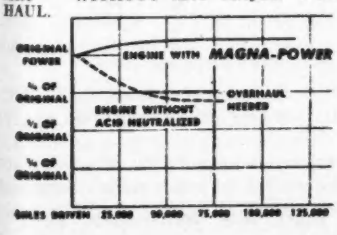
Your oil will last longer! You can not only change less often but also get more miles per quart in between. See for yourself! Put samples of your oil in 2 Pyrex baking cups and heat to 300°F in a GAS FIRED oven — one with the Magna-Power and one without. After 2 hours, shut it off and allow to cool for several hours. Start up the oven again and repeat the whole thing. Keep repeating until 45 or 50 hours of high temperature have been run. (High priced oils may need longer.) Examine the oils and put a drop of each on a white blotter for comparison. The spots below show the vast difference in oil breakdown.



*Two oil spots — one with Magna-Power, one without! These came from the same can! — a well known, nationally available, top grade brand. See text for test conditions. This is the same thing that happens in your engine. The oil warms up in contact with hot blow-by gases — the moisture condenses in the oil, makes acids and breaks down even the best oils.*

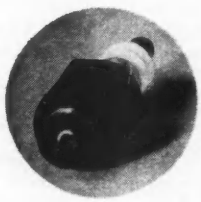
### 2. POWER

Engines maintain full power (or actually increase) — for amazingly long mileages. Many have 180,000 to 200,000 miles and more — WITHOUT ANY MAJOR OVERHAUL.




### 3. IGNITION

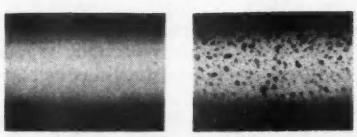
Actual experience shows that your spark plugs should last 2 or 3 times as long as now when they are not fouled by the filth and goo that normally collects in your oil — dissolved in it, so the filter cannot remove it.



*The plug shown is 1 of 8 with 61,810 miles on them and still showing nearly new efficiency. One engine has gone 188,438 miles on 2 sets of plugs — it is still in top condition!*

### 4. WEAR

Measurements show reductions with Magna-Power of 3 to 1 or better under the same conditions.



*The bearing at left above is from an engine with Magna-Power after 112,000 miles in 11 years. It is still good for many more years of service and 4 times the miles. At right is one from a similar unprotected engine after 63,000 miles; IT IS WORN OUT!*

#### WHAT IS MAGNA-POWER?

Magna-Power is the new direct way to kill acid. Acid is the real cause of engine wear. The oil companies are spending millions to add acid neutralizers to their oils but these are not permanent.

#### WHERE DOES THE ACID COME FROM?

Gasoline has sulphur in it. When sulphur burns it makes sulphuric acid right inside your engine. Sulphuric acid eats metal. It destroys detergents and spawns more acid. Little by little the engine is eaten away. Acid is one of nature's methods of reducing metals to their original primitive state.

#### HOW TO NEUTRALIZE THIS ACID

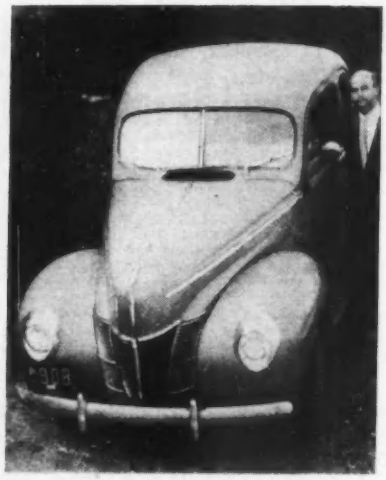
The easiest and surest way is to use a solid chemical neutralizer attached to your oil pan drain plug. The Magna-Power is a drain plug with a rod of special alkaline metal alloy. Acids much prefer this naturally alkaline alloy to the other metals in the engine; but in eating it these corrosive acids are destroyed. Yet there is enough alloy to last 100,000 miles.

**GET A MAGNA-POWER TODAY — NOT A NEW ENGINE TOMORROW**

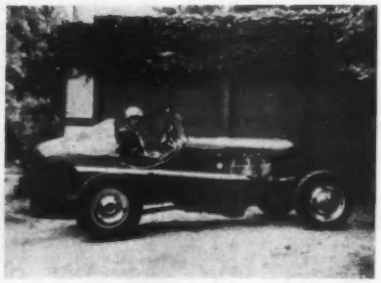
*Turn the page and read the amazing stories of Magna-Power!*



*Fabulous '51 Ford* is shown here with owner Lucius Kingman of McLean, Va. Purchased new by Kingman—Magna-Power was installed in it after 15,000 miles—the car now registers over 100,000 miles. "It has *more* power now than when it was new," says Kingman. "The spark plugs last about 40,000 miles! Amazingly, it burns almost no oil—maybe a quart every 1,500 miles!"



*Original test car* still performs with amazing power and smoothness—*with 191,247 miles on it!* Johns (above) had the pistons removed for inspection when the car registered 116,942 miles and there was practically *no wear!* Magna-Power helps any car—old or new—stay young, healthy and more powerful *longer!*



*Pikes Peak Racer* built by George Balster of Lincoln, Neb., contains a 3-carb, full-race '50 Studebaker engine. George credits Magna-Power with providing "more power, faster starting and a remarkable elimination of wear on all moving parts." Also Magna-Powered is George's family car, a '51 Chev. Sedan with 78,000 miles on it!

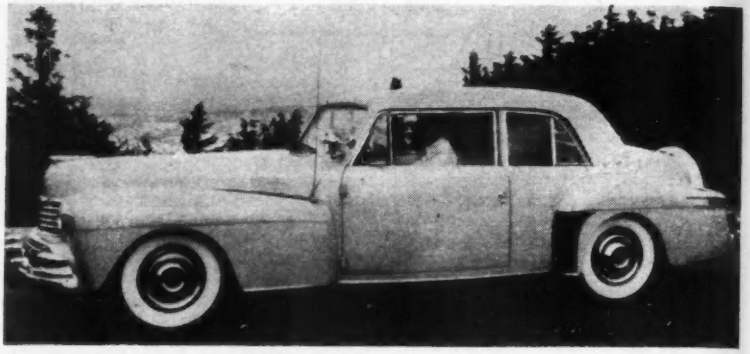
*(Advertisement)*

# The Story of Magna-Power

## —the amazing magnesium-alloy accessory that actually triples the life of car engines

### The principle of Magna-Power was discovered by accident!

During the hectic early years of World War II, a brilliant young M.I.T. graduate named Win Johns was doing vital engine testing work for the U. S. Navy. One of the rigorous tests was designed to discover how long an engine could be run at 250° F. before it burned out. One engine was set up and run at 1800 for 50 hrs. But—at the end of that time, the engine showed no sign of burning out. Johns and his staff tore the engine down and discovered, to their amazement, that there was little or no wear!



*Continental Classic* is kept in like-new condition by owner C. F. Childers of Portland, Ore. Since installing a Magna-Power in this '48 Cont., Childers says, "I can notice an increase of power. It runs smoother than a new car. The plugs stay perfectly clean. And even after being garaged for several weeks, I get trouble-free starting."

**Discovers Principle**

Johns reasoned that this test engine somehow was not being subjected to the factors that cause wear under normal operating conditions. It was found that since this engine was operating *above* the dew point of the blow-by gases, no moisture was getting into the oil, as is common with car engines. Johns knew that sulphur present in all grades of gasoline was (after combustion) combining with moisture in car engine crankcases and forming sulphuric acid. It is this sulphuric acid that attacks the vital parts of engines, aids the formation of damaging sludges, gums and resins and causes 90% of all engine wear. Johns then reasoned that if there were some way to destroy the acid that forms in the crankcase of car engines, he would be able to stop the major cause of engine wear and power fade.

**Develops Magna-Power**

Putting this principle to work, Johns experimented by putting various alloys of magnesium in engine oil to help neutralize and destroy the corrosive acids as they are formed. After many months he developed a special magnesium alloy that was perfect for the job.

Then came months and months of testing to prove beyond a shadow of a doubt that his discovery actually did stop the major cause of engine wear. Johns equipped a 1940 Ford coupe with his special magnesium alloy by attaching a bar of the metal to his crankcase drain plug. He also attached a tiny Alnico magnet to the magnesium to remove any iron or steel filings in the oil. The car was then driven in normal use—stop and go, short trips and long trips. After the Ford had been driven 115,000 miles *without* a single major overhaul or repair, the pistons were removed for inspection. Everyone—including the inventor himself—was astonished!

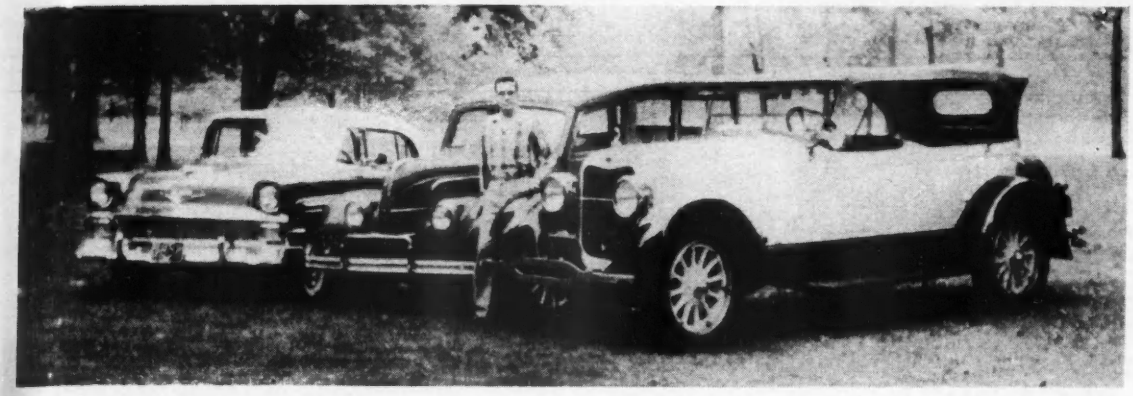
There were practically no signs of wear! Some of the original machining marks were still visible on the rings and pistons. The engine was put back together again.

Today Johns' 1940 Ford is still being driven every day. It now has 191,247 miles on it! Imagine! 191,247 miles! It still retains the pep and power it had the day it came off the assembly line!

Many thousands of miles of controlled tests were conducted on other cars and trucks before Johns put Magna-Power on the market. In one notable experiment,

**JOHNS RESEARCH LABORATORIES, DEPT. M-8, MIDDLESEX, N. J.**

*(Advertisement)*



*Magna-Powered trio,* owned by the Stout brothers, Arthur and Robert, of Plainfield, N.J., is made up of '56 Chev Bel-Aire Convt., '38 Ford Station Wagon and '26 Lincoln Phaeton (Brunn Body). Bob (shown above) and Art are firm boosters of Magna-Power. "All of our cars have more pep and power due to the Magna-Powers in them," Art states. "Our 'baby,' the prize-winning Lincoln, doesn't burn any oil at all. And the oil stays perfectly clean between changes. I'd say a Magna-Power is definitely worth much more than the price you pay for it!" Not shown above is Art's family car, a '54 Nash Rambler—also Magna-Powered!

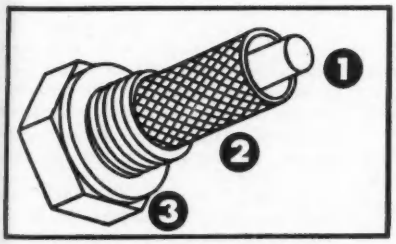
the Farmers & Consumers Dairy Co. of Morristown, N.J., put Magna-Power in half of their 22 door-to-door delivery trucks. After being driven many thousands of miles, the engines without Magna-Power showed 5½ times *more* wear than that of the engines with Magna-Power.

### How Magna-Power Works

Just exactly what is Magna-Power—how does it work? Actually, Magna-Power is a very simple little device. It is a carefully machined bar of a special magnesium-alloy metal. It is attached to the crankcase drain plug (the correct size for your car). It cannot come in contact with moving parts. But it is always in direct contact with your engine oil. Here are the three main things Magna-Power does: 1. effectively neutralizes (destroys) corrosive acids in your oil; 2. greatly reduces the formation of damaging sludges, gums, and resins; 3. destroys the cause of deposits on spark plugs . . . deposits that rob by pre-ignition and internal shorting.

### Magna-Power's Benefits

The direct benefits Magna-Power can give your car engine are these: It reduces wear on vital moving parts up to 80%; it increases engine power by eliminating sludge and resin formations; it slows the deposit build-up on spark plugs—promotes far longer plug life; it allows you to use your oil efficiently for over 3,000 miles before a change is necessary.




1. Powerful Alnico magnet that removes damaging iron and steel filings from the oil.
2. Special magnesium alloy metal that constantly neutralizes and destroys all corrosive acid in the oil as it forms.
3. Crankcase drain plug—the correct size for your car.

### Why Magna-Power is not in new cars

A new car (or a rebuilt one) has to go through a break-in period. The new car engine must actually "wear in"—loosen up for maximum efficiency. Because Magna-Power cuts engine wear by 80%, new car engines would not break in correctly until about 25,000 miles! Magna-Power should be installed in new cars at the end of the normal break-in period when you change oil. Cars that are already broken in—whether your have 5,000, 20,000, 50,000 or 75,000 miles on your car—can be greatly benefited by Magna-Power *immediately!*

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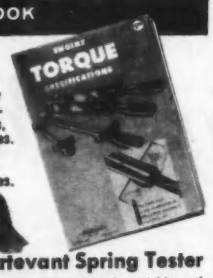
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All other things equal, a lighter car will turn, handle and hold the road better than a heavier car, and these things are more important than brute power. They are the things that determine point-to-point times, except on a dragstrip.

The Borgward Isabella is built to these specs, with as many comfort items as most luxury sedans. Though compact in design, the interior is spacious, compared even to big sedans. Front headroom is 38 in., enough to ride comfortably with a hat. Springing and damping are firm; dips and crests do not propel the car off the road, nor the passengers off the seats. Legroom and hiproom are about four ft., rear is nearly as spacious.

Surprisingly, with 41.7 lbs./hp, the Isabella seems adequately powered. The four-speed all-synchro gearbox is split to multiply the 80 lbs.-ft. of torque to the exact requirements of any situation. Going uphill, for example, it managed to pull a little faster than a fully-extended Rambler 6 that was giving away power to an automatic gearbox. Standard rear ratio is 3.90; gear splits are 3.62, 2.15, 1.36, 1.00. The swing-axle rear makes the best use of the limited power (60 hp), and contributes to roadholding of a high order.

At normally rapid turning speeds, the Isabella tracks in either 3rd or 4th gear with equal tenacity, with a slight tendency for the rear to go out. In high-speed cornering, this becomes accented and it's necessary to back off on steering lock to navigate the turn. When the car turns near the limit, you may find the wheels cut *left* to make a *right* turn.

This is a very pleasant thing for a lazy guy who's willing to let the car's geometry do the work for him. Under lean, the half axles assume different camber, and the concumbent axle arcs help the tail *outward*. (When American sedans lean, rear-end geometry steers the rear *inward* toward the center of the turning arc.) All that's necessary is to turn the front end of the Isabella into the slide.

Big slip angles can be maintained on all four tires throughout the entire arc. For severe cornering, it's advisable to downshift, since torque multiplication produces the thrust that maintains the big slip angles.

Thus, the Isabella possesses the qualities frequently attributed to oversteer; though understeer and oversteer can be determined only by testing, and then only for one velocity on one road with one tire pressure and loading, etc. It is often confused with other things.

We did notice, however, that the faster we turned, the tighter the Isabella went into the center of the arc while we maintained the same turning lock on the steering wheel. It would be a shame to waste this lively feel on someone who didn't appreciate it.

In order to get the best of handling from the Isabella, tires were inflated to 30 psi. This did not detract from the ride; but it did eliminate squeal under hard braking and in sharp turns. It also made steering a lot easier on low-speed turns and particularly when parking. However, on wet roads the car was a little squirrely. The hard tires, combined with the tendency for the tail to swing wide anyway, made one sit up and pay attention when a wet spot appeared in the middle of a high-speed turn. This happened repeatedly on the Angeles Crest Highway, where high-altitude snow had melted into rivulets across the road wherever a depression presented itself. We soon learned to straighten the car through the wet, resetting the drift in the dry.

But don't misunderstand. The car feels solid and safe. Its ability to be handled is just about even with its top speed, and unless modified to go faster, the suspension is just as safe as it is pleasant.

All in all, the Borgward Isabella is a darn good car. It's attractively styled, roomy, adequately powered with intelligent gearbox use and easy on fuel. Really leadfooting, we averaged an actual on-the-road 26.2 mpg. The car is not cheap—$3100—but you get exactly what you pay for *in automobile*. That's a bargain!

—Len Griffin




# Should a car's engine be in the front or in the rear?

It makes quite a difference. Extra weight in the rear end of a car can cause a dangerous driving characteristic called "oversteer." Cars like this will exaggerate the effects of cross-winds and road slopes. This makes them difficult to control on the open highway. In addition, the rear-engine vehicle requires a special springing system, known as the "high pivot swing axle." Cars using this system are not capable of the best road-holding performance. On fast curves, their rear sections often rise and tilt.

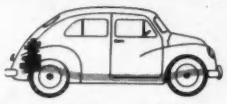
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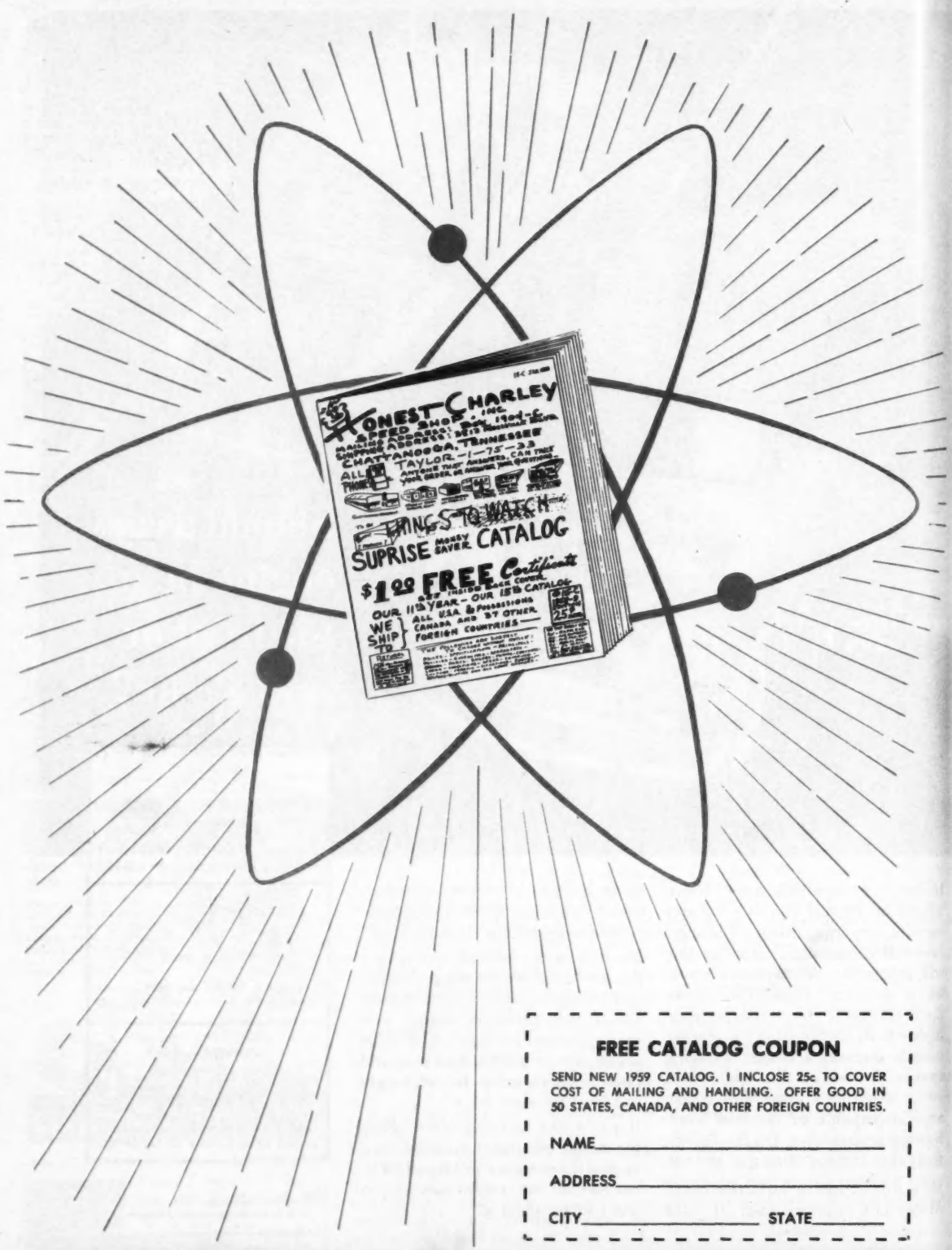
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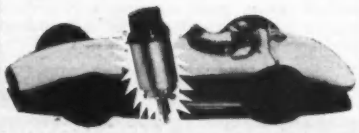


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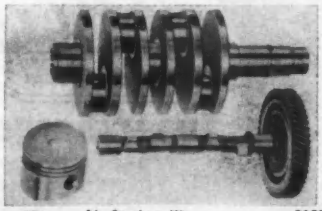
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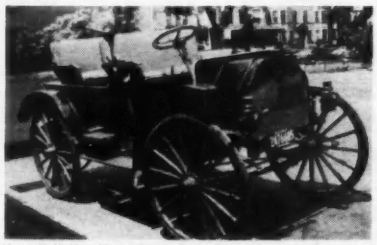


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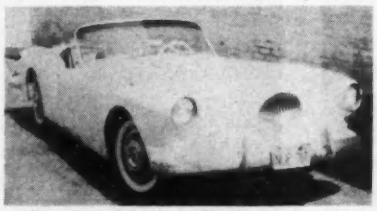


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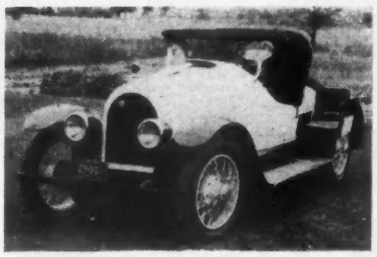


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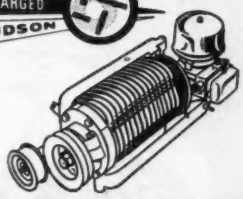
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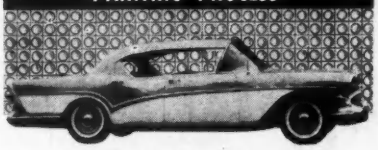
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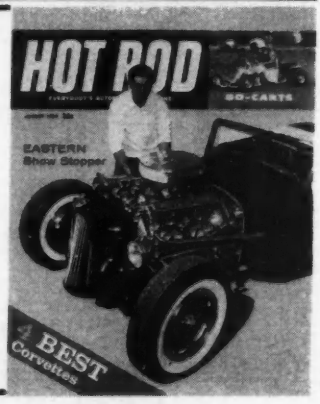
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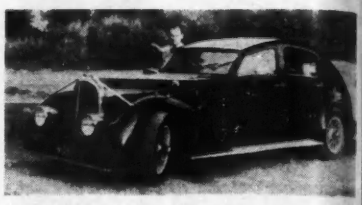
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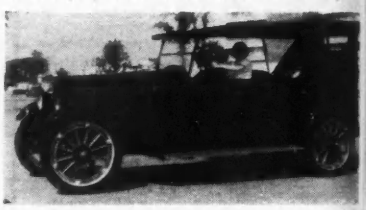


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'31 MARMON V-16 sed. Engine good; body needs restoration. $750. George R. Twilley III, Box 6448, Mather AFB, Calif.
'31 AUBURN Model 898 8-cyl. conv. cpe. 6 wire wheels, rumbleseat, rear trunk. Exc. cond. Best offer over $1500. To be sold at Kingston, Ont., Canada. Dr. Ian Harper, Dept. of Anesthesia, Johns Hopkins Hospital, Baltimore 10, Md.
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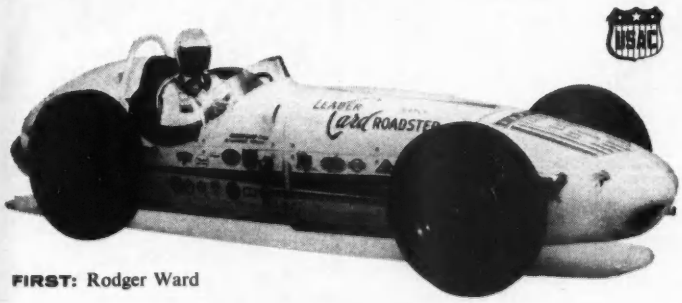
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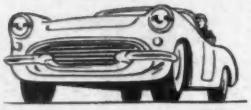
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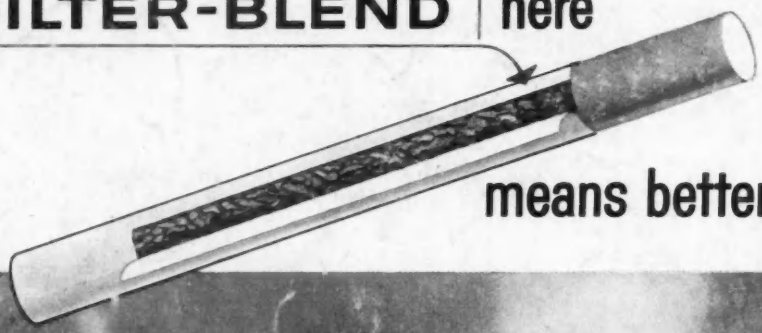
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